RESPLENDENT TROGON OR QUEZAL
(*Pharmacrus mocinno*)

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BIRDS OF THE WORLD

A POPULAR ACCOUNT

BY

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WITH A CHAPTER ON THE ANATOMY OF BIRDS

BY

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THE WHOLE EDITED BY

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WITH 16 COLORED PLATES AND 236 ILLUSTRATIONS

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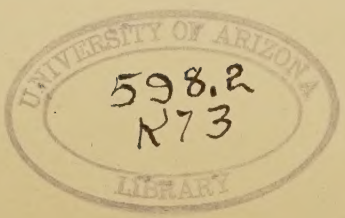

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EDITOR'S PREFACE

THE Editor's share in the preparation of the present work consists of scarcely more than a careful reading and slight revision of the manuscript, the planning and general execution being entirely by the Author. So well, indeed, had Dr. Knowlton performed his task that there was need for scarcely more than perfunctory revision; a slight correction, here and there, together with an occasional suggestion concerning a questionable or doubtful statement, or one involving a difference of opinion between authorities, or that a particular conclusion be reconsidered, being practically the extent of the Editor's censorship.

ROBERT RIDGWAY.

WASHINGTON, D.C.,
April 15, 1907.

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PREFACE

It is perhaps hardly necessary to call attention to the great awakening of popular interest that has come about in recent years in relation to our birds, an interest that has been fostered not only by the admirable work of the Audubon Societies and the widespread nature teaching in the schools, but by the deeper, broader sentiment which is leading back to, and nearer to, Nature. The increasing number of people yearly turning back to the country, either for recreation or permanent residence, has naturally stimulated a desire to know more intimately their surroundings, — the trees, the flowers, and the birds. Few of these people have either the inclination or the desire to become professional ornithologists, but they have wished to know at least the names and more interesting facts in the life histories of the birds they see constantly about them. To supply this demand for popular information, a large number of works have been written, and their extensive circulation proves that they have filled a real want. But most of these are more or less local in their scope, only a very few, for instance, treating of the birds of a whole country, and the time seems ripe for a work of moderate size, and in a single volume, that shall set forth in non-technical language the salient facts regarding the birds of the world. Such a work I have attempted to prepare.

Following several preliminary chapters on the general appearance and structure of birds, their migrations, distribution, classification, etc., every family has been passed in review and accorded approximately equal and even treatment. In many cases this amounts to a mention of all the known species of a family; but in the larger families it has, of course, been possible to include only the more important or more interesting forms, though it is presumed that enough have been included to give a fairly comprehensive picture. The treatment of the so-called game birds, both aquatic and non-aquatic, has purposely been made very full, in the hope that it may also prove of interest to sportsmen as well as to the general reader. Technical language has been avoided, so far as possible; but in outlining the various groups a certain amount has been necessary, since the characters separating them are often relatively obscure, structural details. The main attention has been given to the birds as they appear in their homes — that is, their plumage, habits, songs, nests and eggs, food, etc. It is not intended for this book to be used for the identification of collections of bird skins, for the descriptions of size and plumage have only been made full enough to enable one to draw a fairly definite picture of the living bird. For the complete, technical descriptions the reader is referred to the numerous well-known treatises on the subject.

A work of the present scope is of necessity very largely a compilation, but I have sought in every instance to give the latest and most authentic information regarding the distribution and life history of the forms treated. That I have succeeded in all cases is too much to expect, for the literature of ornithology is now so very extensive and widely scattered that it is inevitable some things have been overlooked, though it is hoped that important omissions and errors are few. Among the hundreds of books, papers, and journals consulted, special mention should be made of Sharpe's "Hand-List of Birds," the "Catalogue of Birds in the British Museum," Newton's *Dictionary of Birds*, Dr. Stejneger's volume on *Birds* in the Standard Natural History, and Ridgway's "Birds of North and Middle America," without which it would have been impossible to write this book.

In the matter of direct quotations from other authors, which have been freely made, the authority for the statement has been given, either in the introductory sentence or at its termination, but it has not been thought necessary in a popular work of this character to give in all cases the complete bibliographic citation. The professional ornithologist will be able, in most cases, to identify the publication should further consultation be desired; while the general reader, it was assumed, would hardly be interested in anything but the statement of fact. In order to facilitate the ready finding of the various forms mentioned in the text, a very complete index has been prepared, which includes not only all specific, generic, and higher group names, but every common name made use of. To further facilitate the location of the birds referred to, all common or popular names of birds have been capitalized and given first place, with the scientific names following in parentheses. The black-face headings at the beginning of each paragraph also serve to direct attention to any species sought.

The chapter on the "Migration of Birds," in nearly its present form, appeared in the *Popular Science Monthly*, and is incorporated here with the permission of the editor of that journal.

The selection of the illustrations for this book has given the author much concern. To keep the book light, it is essential to avoid as far as practicable the use of the coated paper needed for half-tones. This necessitated securing for the text, wood and line cuts from miscellaneous sources not always equally modern or artistic. While a freer use of half-tones would have permitted the utilization of more modern photographs, it would have made the book almost fatally heavy; but it is hoped that the figures finally selected may serve the purpose of conveying a fair idea of the forms depicted.

In the preparation of the originals of the colored plates, the author has been fortunate in securing the services of the talented artist, Miss Mary Mason Mitchell of Washington. Not only are the birds themselves accurately and artistically portrayed, but the setting for each has been worked out with a minuteness and correctness of detail rarely exhibited.

In the preparation of this work I have received the greatest assistance from Dr. Charles W. Richmond, Acting Curator of Birds in the United States National Museum, who has not only read all of the manuscript and proofs, and suggested

many corrections, changes, and additions which have materially increased its value, but has permitted me every opportunity of examining the collection of birds in his charge. Mr. Frederic A. Lucas, Head Curator of the Brooklyn Museum of Arts and Sciences, has read portions of the manuscript, and made valuable suggestions, and has also written the chapter on the "Anatomy of Birds." Mr. J. H. Riley, of the United States National Museum, has called my attention to a number of things that might otherwise have been overlooked, and Dr. C. William Beebe, of the New York Zoölogical Garden, has been of great assistance in securing and reproducing the figures. To Mr. Robert Ridgway, Curator of Birds in the United States National Museum, I was indebted for many valuable suggestions, especially in regard to classification, before it was known that he was to edit the book. Since the completion of the work he has read the manuscript and suggested certain changes and slight revisions of statement, the extent of his work being indicated in the Editor's Preface which precedes. To these and all others who have assisted in the preparation of the book, I make grateful acknowledgment.

Following are the sources for most of the figures used, acknowledgment for which is hereby made: —

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F. H. K.

United States National Museum,
January 1, 1909.

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CHAPTER I

INTRODUCTION

EFINITION of a Bird. — Strange as it may seem, the old proverb that "A bird is known by its feathers," finds such exemplification in the science of to-day that it has actually become the scientific definition of the Class. It was formerly supposed that birds possessed a number of peculiar features, but, says Mr. Ridgway, "the most recent investigations of comparative anatomists have gradually eliminated the supposed exclusive characters of birds, as a class of the Animal Kingdom, until only the single one mentioned above, the possession of feathers, remains." As Dr. Stejneger very aptly expresses it, "No bird is without feathers, and no animal is invested with feathers except the bird."

From the fact that in most systematic arrangements of the Animal Kingdom the Class embracing the birds is usually made to precede the mammals, it might be supposed that the birds were more or less closely related to them. As a matter of fact this is not so, for, according to Beddard, beyond the circumstance of "warmbloodedness and resemblance of some of the more simple forms of feathers to hairs, there is nothing to be said in behalf of a kinship between birds and mammals." In some ways birds are undoubtedly the highest of the vertebrate animals. Their body temperature, higher than that of any other animals, is one index of their intense activity; their skeleton is perhaps more modified from the general type than that of mammals, their "arrangements for locomotion, breathing, and nutrition are certainly not less perfect," and it is, in fact, "only when we emphasize the development of the nervous system and the closeness of connection between mother and offspring, that the mammals are seen to have a right to their preëminence over birds."

It has long been settled with definiteness that the Class of birds is very closely allied to the Class of reptiles; for even at the present time, that is among living birds and reptiles, there are numerous structural points in common. It is, of course, perfectly easy to distinguish between a bird and a reptile as each exists at present, the most obvious difference being the warm blood and outer covering of feathers in the bird, and the cold blood and usually scaly covering among reptiles. On account of unfortunate breaks or gaps in the palæontological record, we are, with the exception of the evidence afforded by Archæopteryx, in ignorance of the precise steps in the transition from one Class to the other, and may always remain so, but as was long ago pointed out by Huxley, Cope, Marsh, and others, it is probably in the group of extinct dinosaurs that we must look for evidences of

this affinity. This large reptilian group embraces a number of forms, particularly those of carnivorous habits, that without doubt regularly progressed in a bipedal manner, and it was from the obvious similarity between these and the birds that Huxley concluded that "there could be no doubt that the hind quarters of the Dinosauria wonderfully approached that of birds in their general structure, therefore, that these extinct reptiles were more closely allied to birds than any which have lived." Other anatomists have held that these resemblances in structure are simply adaptive, and came to be evolved in the dinosaurs from community of habit with birds, but very recently Professor H. F. Osborn has reëxamined the evidence and has detected a number of additional points of agreement in skeletal characters, and concludes that this hypothesis is not to be discarded, but is to be "very seriously considered" in connection with the origin of birds. Still more recently (1905) Professor E. Ray Lankester, director of the British Museum [Natural History], says: "The reptiles which come nearest to them in structure are the Dinosaurs, especially these Dinosaurs (like Iguanodon) which walked on their hind legs and had only three toes to the foot."

In any event it seems safe to assume that if not more intimately related, the dinosaurs and birds must at least have had a common ancestor. Within the past few months, Mr. W. P. Pycraft, the eminent avian anatomist of the British Museum, has presented an interesting speculation regarding the probable appearance of the ancestral or incipient birds anterior to Archæopteryx. He says: "From what we know of other types of vertebrates we may safely assume that these ancestral birds were of small size, and were probably also arboreal. And from the unmistakable signs of the shortening of the body in modern birds, the trunk was also relatively longer, as it certainly was in Archæopteryx. From these two inferences we conclude, with some degree of probability, that these creatures, these 'birds in the making,' had substituted leaping for climbing about the trees. And from this there was but a short passage to leaping from tree to tree. In these movements we may reasonably suppose that the fore limbs were used for grasping at the end of the leap. The use of the fore limb for this work would naturally throw more work upon the inner digits — 1–3 — so that the work of selection would rapidly tend to the increased development of these, and the gradual decrease of the two outer and now useless members. Correlated with this trend in the evolution, the axillary membrane — the skin between the inner border of the arm and the body — became drawn out into a fold, while a similar fold came to extend from the shoulder to the wrist, as the fore limb, in adaptation to this new function, became more and more flexed. While the fingers, upon which safety now depended, were increasing in length, and growing more and more efficient, they were, at the same time, losing the power of lateral extension, and becoming more and more flexed upon the fore arm. And the growth in this direction was probably accompanied by the development of connective tissue and membrane along the hinder, post-axial border of the whole limb, tending to increase the breadth of the limb when extended preparatory to parachuting through space from one tree to another, the long claws being used to effect a hold at the end of the leap. The hind limbs, though

to a less extent, were also affected by the leaping motion, resulting in the reduction of the toes to four, and the lengthening, and approximation of the metatarsals 2–4 to form a 'cannon' bone.

"The body clothing at this time was probably scale-like, the scales being of relatively large size and probably having a median ridge, or keel, recalling the keeled scales of many living reptiles. Those covering the incipient wing, growing longer, would still retain their overlapping arrangement, and hence those along the hinder border of the wing would, in their arrangement, simulate in appearance and function the quill feathers of their later descendants. As by selection their length increased, so also they probably became fimbriated, and more and more efficient in carrying the body through space."

Temperature. — It is a generally recognized fact that the temperature of birds is normally very high, but, strange enough, exact data on the subject are not extensive. Recently Mr. A. Southerland undertook to ascertain the temperature of certain "Ratite" birds, and one of the most interesting incidental facts brought out is the demonstration of a progressive increase from the lower to the higher birds; that is, the forms of birds that are regarded as the lowest in the scale exhibit the lowest normal temperature, while between these and the more active and highly organized there is almost every gradation. This condition also prevails at least to some extent among mammals. The Apteryx or Wingless Birds of New Zealand exhibit the lowest temperature thus far recorded among birds, the average of three individuals belonging to two species being 37.9° C. (100.2° F.). Next to the Apteryx come the Emeus, Cassowaries, and Penguins, with an average normal temperature of 39° C. (102.2° F.), while the Tinamous examined showed a range from 39.2° C. to 41.3° C., or an average of 40.6° C. (105° F.), "which brings them up to the lower limit of the range of temperature usual for ducks, game birds," etc. The common fowls when lifted quietly off their perches at night have a temperature of 40.6° C. (105° F.), but when lifted by day from nests whereon they are brooding, their temperature averages 41.7° C. (107° F.). From these birds there is another decided advance when we come to the great groups of small and excessively active birds such as Sparrows, Warblers, etc., their temperature ranging from 42° C. (107.6° F.) to 44° C. (111.2° F.), with an average of perhaps 109° F., or fully ten degrees above that of man.

Feathers. — We may now advert to a consideration of the peculiar outer covering of birds; namely, the feathers. A normal feather (Fig. 1) consists of a hollow transparent basal portion called the barrel, or *calamus*, continuous with which is the main shaft, or *rachis*, which is opaque, roughly quadrangular in cross-section, and filled with a pithy substance. The rachis is furrowed along its inner surface; that is, on the side next the body of the bird. From the rachis above the barrel arise a "series of lateral branches, the *barbs* or *rami*, which in turn give rise to the *barbules*, and these to minute, often hooked processes, the *barbicels*" (Fig. 2). It is by the hooking together of these processes that the web is produced and strength is given it to resist or act upon the air. Springing from the under side of the feather, in many cases, at the juncture of the barrel with the web-bearing portion, is a secondary feather, or *aftershaft*, as it is called.

In some birds, as in the Cassowaries and Emeus, the aftershaft is as large as, or larger than, the main portion of the feather, while in others it is greatly reduced or even absent.

Not all feathers exhibit as complicated a structure as that above described. In many cases the feather is much reduced, as for example in the wing-quill of the Cassowary, which consists merely of the stiff, naked stem or rachis. The so-called *filoplume* is another modification of the typical feather, a good example of which may be seen on the body of a common fowl after the removal of the outer or *contour* feathers It is to all appearances a slender hair, but in reality it is a degenerate feather which has a very short barrel and a thin, hair-like rachis with few or no branches. Usually the filoplumes are entirely concealed by the contour feathers, although in some birds, as the Cormorants, they form tufts of plumes on the sides and back of the neck which project beyond the outer (contour) feathers. A further modification is found in the so-called "*downs*," these being feathers in which there is no rachis, the long fluffy branches all arising at the top of the barrel: they are concealed by the contour feathers. In certain birds, such, for example, as the Herons, Bitterns, some Hawks, Parrots, Tinamous, etc., the downs are aggregated in special patches, called "*powder-downs*," in which the ends are continually breaking off into fine, dust-like particles. In the Herons, for instance, the powder-downs form enormous patches, — a pair on the breast and a pair over the thighs. Their nature is not well understood, although their presence may constitute a well-marked character for descriptive purposes.

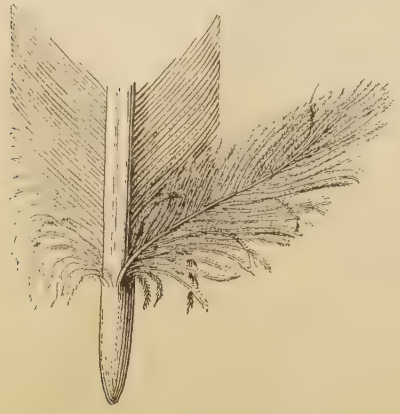


Fig. 1. — Feather and aftershaft.

Colors of Feathers. — The colors of feathers, or their apparent colors, constitute an exceedingly interesting phase of this subject. In accordance with the latest authorities the colors of feathers may be conveniently classed under three heads. The first of these, and the most general, are called chemical or absorption colors, since they are due to the presence of distinct coloring-matter. This coloring-matter may be in the form of a pigment, or may be a coloring solution, which is distributed in or among the cells composing the various parts of the feathers. Under this category come black, red, and brown, mostly the orange and yellow, but rarely green, and never blue. These colors may be recognized by the fact that they do not change under any condition of illumination or the position of the eye viewing them, and certain of them, as black, red, and yellow, may be separated in a practically pure state by well-known methods of chemical manipulation. One of the most interesting, known as *turacin*, is found in the red feathers of the Plantain Eaters (*Musophagidæ*). It contains the same chemical elements as

those found in black feathers, but with the addition of from 5 to 8 per cent of copper, and these birds lose their red color when washed by the rain, but regain it again when dry. The water in which they bathe is said to become reddish.

The second kind of coloring results from the combination of a pigment with certain structural peculiarities, such as ridges and furrows, in the surface of the feather itself. Such colors as violet and blue, usually green and sometimes yellow, belong under this heading. In transmitted light feathers with these colors show only the color of the pigment. "For instance, the deep green or blue feathers of a Parrot will thus appear only gray or yellowish. The same happens when their polished surface is scratched or crushed; the blue color instantly disappears, showing only the blackish underlying pigment, or yellow pigment in green feathers. When thoroughly wetted in a bath the feathers of the back of an Amazon Parrot appear brown without a trace of green." — NEWTON.

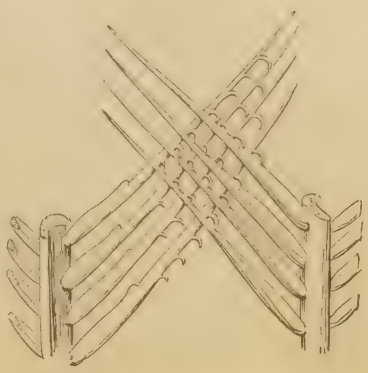
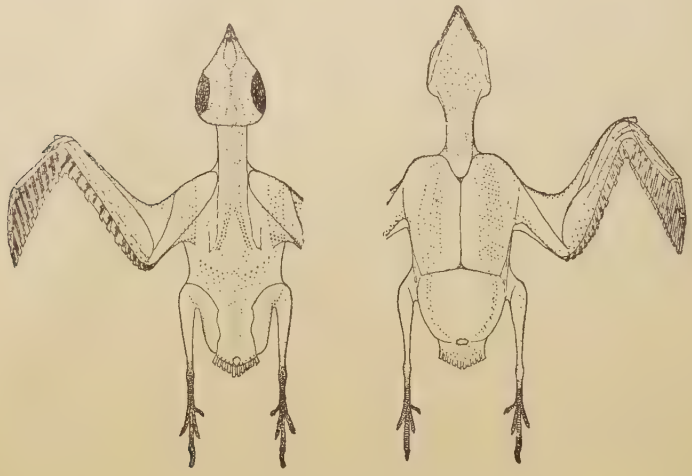


FIG. 2. — Two enlarged barbs of a feather, showing interlocking barbules and barbicels.

The third form of coloring, or apparent coloring, includes the exquisitely beautiful prismatic or metallic colors, such as those found in Hummingbirds, the Birds of Paradise, Peacocks, Doves or Pigeons, Starlings, Grackles, and very many other birds. The manner in which these effects are produced has given rise to much speculation, and an extensive literature exists upon the subject, but even now the question can hardly be considered as definitely settled. The commonly accepted hypothesis is that metallic colors are due entirely to the structure of the surface of certain parts of the feathers, such as striæ, ridges, knobs, or pits, in combination often with extremely thin, transparent, colorless layers, these elements, it is asserted, acting as prisms and changing the color as the direction of the light and the position of the eye change. Recently Dr. R. M. Strong appears to have demonstrated that the above explanation fails to meet certain of the physical requirements of the case. In investigating the metallic colors of feathers from the sides of the neck of the domestic Pigeon, he failed to find striæ or other inequalities on the outer surface of the barbules that were sufficiently numerous or uniform enough to produce the observed colors by diffraction, but he did find that the barbules within the metallic area were strikingly different from those outside it. Instead of lying vertically, as in the non-metallic areas, they are turned so that one side faces upward, thus giving a much greater reflecting surface. The dorsal face of these barbules is provided with an outer transparent wall which encloses cell-cavities filled with pigment, this coloring-matter being in the form of spherical granules in the metallic-colored barbules, whereas in the non-metallic-colored areas the granules are of the

typical rod shape. He therefore concludes that "the metallic colors of these feathers are probably thin-plate interference colors or Newton's-rings effects, which are produced when spherical pigment granules come in contact with the outer transparent layer." The whole subject of coloration is treated at length by Newton in his "Dictionary of Birds," to which the reader is referred for fuller information.

Pterylosis. — It is a fact of common observation that in the hair covering of certain mammals, such as the horse, dog, cat, etc., the hairs are set as closely together as practically possible, forming a continuous covering. From the fact that in most birds, the entire body, except the beak and feet, is ordinarily covered by the feathers, it might be inferred that they are as continuously and evenly dis-



FIGS. 3 and 4. — Pterylosis of Nighthawk.

tributed over the body as are the hairs of mammals. This condition is far from true, however, as may be readily demonstrated by plucking the feathers from the body of any common bird, when it will be seen that the feathers are only borne on certain definite areas or tracts, being ordinarily spread out so as to more or less completely cover the body. This peculiarity was noticed and especially emphasized by Nitzsch, a celebrated German ornithologist, some sixty years ago.

The feather areas he called "feather-forests," or *pterylæ*, and the naked spaces *apteria*, from the Greek, signifying "without feathers." The description of the feather distribution in birds is called *pterylosis* or *pterylography*. The most important of the feather tracts are as follows: A spinal tract which runs down the backbone from the nape of the neck to the tail; a ventral tract, which "runs from the throat down the front of the neck, and dividing at its base, passes down on each side of the breast and abdomen to the inner side of the thighs quite to the end of the body"; the humeral tracts, a pair of tracts running across the upper

arm, and forming what are called the scapulars; and the femoral tracts, a pair of tracts over the thighs. The pterylosis of the Nighthawk is shown in the accompanying figures (Figs. 3, 4).

It has been found that the extent and distribution of the feather tracts and bare spaces are relatively very uniform for certain groups of birds, so uniform, in fact, that pterylosis was made the basis of an elaborate scheme of classification of birds by Nitzsch. That it is of diagnostic value in many cases cannot be denied, but when relied upon too implicitly it not infrequently leads to what are obviously unnatural assemblages. Further than this we are still in ignorance of the pterylography of a vast number of birds, for the subject has been largely neglected since the time of Nitzsch. When a larger array of facts is at hand it may be possible to extend its usefulness.

The only birds at present known to have a continuous feather covering are the Penguins and Screamers, although formerly the Ostriches and their immediate allies were supposed to fall within this category. Apteria have long been known to occur in the embryos of certain "Ratites," as the Ostrich, Rhea, and Apteryx, but recently Pycraft has shown that small but relatively important apteria occur in the adults of all members of this group.

Development of Pterylosis. — In a communication before the American Ornithologists' Union, November 18, 1903, Dr. Hubert Lyman Clark presented some important results of his examination into the development of the pterylosis. The material studied consisted of 54 embryos belonging mainly to different groups of birds such as Herons, Rails, Sparrows, Woodpeckers, Hummingbirds, and Swallows. In every instance he was able to distinguish the outlines of certain of the principal feather tracts before the body of the bird had assumed very definite form, — for example, before the shape of the head could be distinctly made out. In all cases examined the caudal tract was the first to be outlined, and further the middle pair of tail-feathers was uniformly the first to appear. At this stage in the development of the embryo the tail was disproportionately long and had the feathers disposed along it in pairs, a condition very suggestive at least of the tail of Archæopteryx. As a further interesting result it was shown that in the specimens studied the secondaries of the wing were the first to appear, thus confirming the result of Pycraft's studies on the development of the Mound-Builders (*Megapodidæ*). The primaries were found to be developed distally; that is, from the angle of the wing toward the tip. It would seem that characters as deep seated as these have been shown to be must have an important bearing on the taxonomy of birds when we are in possession of a sufficient body of facts to permit of generalization, but, as Dr. Clark pointed out, we do not yet know the complete history of the development of the pterylosis of a single species of bird.

The causes which have led to the development of feather tracts and consequent bare spaces are not well understood. The suggestion that it is simply another example of nature's economy of material seems hardly an adequate one; the explanation advocated by Mr. F. A. Lucas, namely, that it is a case of adaptation, being decidedly more logical. On this point Mr. Lucas says: "The pterylosis of all birds is more or less adaptive, having some direct relation to their habits,

and this adaptation is well shown in Hummingbirds. The bare tracts on the nape and along the throat allow the neck to readily lie against the middle of the back, or to bend downward over the points of the breast-bone, while the bare spaces under the wings and along the sides of the body permit the wings to be easily and closely applied to the body, the sides conforming almost exactly to the curve of the edge of the folded wing. The large bare space on the under side, found in nearly all birds save the water fowl, is merely to allow the warmth of

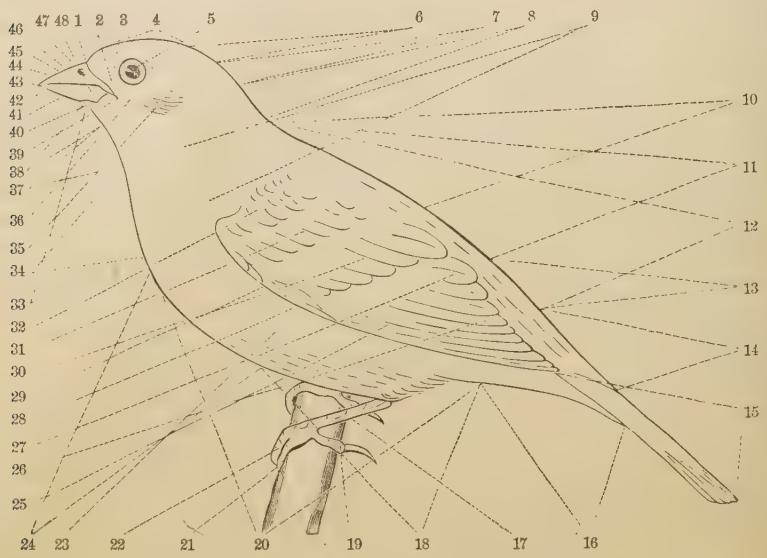


FIG. 5. — Topography of a bird. (From Coues's "Key.")

1, forehead (*frons*); 2, lore; 3, circumocular region; 4, crown (*vertex*); 5, eye; 6, hind head (*occiput*); 7, nape (*nucha*); 8, hind neck (*cervix*); 9, side of neck; 10, interscapular region; 11, *dorsum*, or back proper, including 10; 12, *notæum*, or upper part of body proper, including 10, 11, and 13; 13, rump (*uropygium*); 14, upper tail-coverts; 15, tail; 16, under tail-coverts; 17, tarsus; 18, abdomen; 19, hind toe (*hallux*); 20, *gastræum*, including 18 and 24; 21, outer or fourth toe; 22, middle or third toe; 23, side of the body; 24, breast (*pectus*); 25, primaries; 26, secondaries; 27, tertiaries, nos. 25, 26, 27, are all *remiges;* 28, primary coverts; 29, *alula*, or bastard wing; 30, greater coverts; 31, median coverts; 32, lesser coverts; 33, the "throat," including 34, 37, and 38; 34, *jugulum*, or lower throat; 35, auriculars; 36, malar region; 37, *gula*, or middle throat; 38, *mentum*, or chin; 39, angle of commissure, or corner of mouth; 40, ramus of under mandible; 41, side of under mandible; 42, *gonys;* 43, *apex*, or tip of bill; 44, *tomia*, or cutting edges of the bill; 45, *culmen*, or ridge of upper mandible, corresponding to gonys; 46, side of upper mandible; 47, nostril; 48, passes across the bill a little in front of its face.

the body to be directly applied to the eggs during incubation, and in birds like Ducks and Penguins (also Auks), which are densely or completely feathered beneath, a bare space is present during the breeding season."

Renewal of Feather Covering. — Although a considerable proportion of the feathers in flying birds are relatively strong, especially those of the wings and tail, the more or less active life of their owner results sooner or later in the wear and often injury of all feathers. The chief of the destructive influences to which feathers are subjected are abrasion and fading, the one a mechanical disintegration, and the other a chemical decoloration. Besides these there are other minor factors, such as "the age of a feather, its position, its structure, its color, and the

habits of the bird." It is thus evident that if a bird were provided with only a single set of feathers, they would ultimately become so worn and frayed as to be useless, either as a covering for the body or for flight. By a wise provision of nature, the entire feathering is renewed at periodic intervals. This renewal, known as the moult, takes place normally once a year, usually after the arduous duties of rearing the young are over; but there are numerous exceptions to this, some birds acquiring two, three, or exceptionally even four, more or less complete annual changes of plumage, and further, these moult periods "must not be confounded with occasional new growth at any time and anywhere to replace feathers accidentally torn out." In order that the ordinary activities may not be seriously interfered with during the period of moult, there is a distinct relation between the feather loss and feather gain, most birds at no time being deprived of either the power of flight or the protection afforded the body by the feathers, and furthermore this fall and replacement is more or less synchronous from the opposite sides of the body. Thus in probably all of the great group of Passerine birds, the moult of the flight feathers begins in the middle of the wings with the practically simultaneous fall of the proximal or innermost primary on each side. As soon as the old feather has fallen, the new forming feather pushes into view, and grows rapidly, and by the time the expanded portion of the feather itself is breaking from the apex of the follicle the next primary falls, and so the renewal by pairs proceeds outwards. With the secondaries the renewal proceeds in the opposite direction, that is the outer or distal one on each side falls first, this loss being very nearly coincident with the fall of the fifth or sixth primary, and their replacement by pairs proceeds towards the body. In some cases, as in Ducks, Geese, Swans, and Flamingos, the wing-quills are all shed at once, thus rendering the birds practically helpless for a short time, but this is very exceptional. The feathers of the tail are also normally renewed in pairs, the central pair falling first, followed by the quills next adjacent on either side. The process, however, is much more rapid than in the wings, for by the time the outer pair has fallen the middle ones are often not half grown. The renewal of the body feathering is in less obvious sequence, though "the moult regularly begins at fairly definite points in the feather tracts, radiating from them in such manner that the outer rows of feathers where the tracts are widest, and their extremities are normally the last to be replaced." — DWIGHT.

Renewal of Parts other than Feathers. — Although the renewal of the plumage is the most important event of this kind, the feathers are by no means the only part of the integument that is periodically changed. Thus in certain Grouse the claws or pectinations along the sides of the toes become greatly lengthened in winter and are partially shed or worn down in spring and summer; the Puffins and Auklets shed portions at the base of the bill and around the angle of the mouth; the Penguins, or at least the King Penguin, moults the bright orange-colored membrane at the base of the bill; the American White Pelican develops a curious appendage on the upper mandible which is shed at the close of the nesting period. These phenomena and others of similar character will be more fully described under various forms exhibiting them.

Age of a Feather. — After a feather attains its maturity the contents of the quill dry up and it is incapable of further development. It becomes, so to speak, "dead." A great deal has been written to prove the contrary; namely, that a feather may, after it reaches its maturity and does duty for a varying length of time, again take on a period of active growth and change. This is to account for certain so-called "changes of plumage without moult." But it seems to be now settled beyond any reasonable doubt that when a feather completes its growth, and the contents of the quill become dry and "lifeless," it can never reinaugurate the process. There may be a fading or bleaching, or the outer extremities of the feather may be abraded in one manner or another, resulting oftentimes in a freshening or brightening of the plumage, as for example in the spring plumage of Purple Finches, Crossbills, etc., but this is quite different from a renewed growth and repigmentation of the individual feathers. This brightening of the plumage in the above-mentioned species was long ago shown to result from the fact that the winter feathers have red barbs and gray barbules, and on the latter wearing away, the red elements of the feather are exposed. Beyond these relatively slight changes by abrasion or disintegration of the tips, or by fading, change of plumage can only result from moult.

It is only within the last few years that any extended researches have been undertaken in this country with a view of elucidating the sequence of plumages and moults in our birds, and while an extensive body of facts has been accumulated, much still remains unknown. Those who wish to look further into this subject should consult the papers mentioned below by Witmer Stone [1] and Dr. Jonathan Dwight, Jr.[2] The latter author has placed the terminology of the subject on a uniform and logical basis. His scheme will be understood from the following tabular arrangement: —

Plumages	Moults
1. Natal (Down).	1. Postnatal.
2. Juvenal ('First plumage').	2. Postjuvenal.
3. First winter.	3. First prenuptial.
4. First nuptial.	4. First postnuptial.
5. Second or adult winter.	5. Second or adult prenuptial.
6. Second or adult nuptial.	6. Second or adult postnuptial.

Nests and Eggs of Birds. — A word should perhaps be said in regard to the nests and eggs of birds, but in the space at command it can be but the briefest outline of a broad and extremely complicated field. It is perhaps unnecessary to state that all existing birds, without a known exception, lay eggs. To a casual observer, viewing a large collection of birds' eggs, the variation in size, shape, color, markings, etc., seems almost infinite. For the differences in size he is

[1] "The Moulting of Birds with Special Reference to the Plumages of the Smaller Land Birds of Eastern North America," Proc. Acad. Nat. Sci. Phila., 1896, pp. 105–165.

[2] "The Sequence of Plumages and Moults of the Passerine Birds of New York," Ann. N. Y. Acad. Sci., vol. 13, 1900, pp. 73–360, plates 1–7.

prepared from his knowledge of the known differences in the sizes of birds producing them, yet there are noticeable surprises even in this respect. But the attempt to account for the striking differences in shape, color, and markings of eggs seems an almost hopeless one, yet such attempts have been made, though, it must be confessed, with varying degrees of success. Theoretically we may be justified in presuming that the lowest of existing birds, that is those that are supposed to approach most closely to their reptilian ancestors, should produce eggs or have habits of nidification showing the closest approach to the reptiles. An examination of the facts, however, shows that this relationship is capable of demonstration to a limited degree only. In the first place, it appears that much is still to be learned regarding the oölogy of existing reptiles. Broadly speaking, the eggs of all reptiles are white in color and spherical or ellipsoidal in shape. Nothing is at present known regarding the eggs of either the ancient reptilian or avian ancestors of our birds, although, as Shufeldt has suggested, it is by no means impossible that such remains may sometime be found, especially those of the Toothed Birds. Fossil eggs of turtles have been obtained, as well as fossil or subfossil eggs of a few species of birds, but they throw little or no light on the question at issue. It is, then, from this hypothetical starting-point that all the marvelous diversity observable in the eggs of living birds has been developed, but the steps by which it has been accomplished are, and must perhaps remain, obscure. Natural selection has doubtless played a most important rôle, though the "whys and wherefores" are far from being satisfactorily answered. There are certain salient groups of facts that stand out boldly, yet the exceptions are so numerous and marked as to prevent establishing any adequate chain of cause and effect. Thus practically all birds that nest in holes, such as the Woodpeckers, Kingfishers, Bee-eaters, Rollers, Hornbills, Barbets, Puff-birds, Trogons, Toucans, Parrots, Parakeets, and Swifts, lay white eggs, yet the coördinate groups of Owls, Hummingbirds, and Pigeons, that build an open nest, also lay white eggs, while many birds that habitually nest in holes lay spotted or even richly colored eggs. Again, it is often possible to trace a marked similarity in pattern of coloration throughout nearly all the species of a whole natural family, or a large genus, but for which "the conditions of environment offer no explanation, since it as often occurs in cosmopolitan groups as in those of local distribution, and which, in the present state of our knowledge, seems wholly inexplicable."

Theory of Birds' Nests. — So, also, are we without an adequate theory of birds' nests. "Why the thousands of species of birds," says Dr. J. A. Allen, "build each a peculiar nest, differing more or less in situation and architecture from those of all other species, is a question which has yet received no satisfactory answer. As a rule the nest, including its location, the materials and manner of its constructure, is as distinctive of the species as the number, size, form, and color of the eggs, or, in some instances, as any fact in its history, not excepting even the details of structure and coloration of the bird itself. Why this is so we can perhaps explain when we can satisfactorily account for the diversity of song that is scarcely less a scientific characteristic."

The attempt has been made to explain it on the ground of a connection between

the colors of the female and the mode of nidification. That is, according to Wallace, "when both sexes are of strikingly gay and conspicuous colors, the nest is such as to conceal the sitting bird, while, whenever there is a striking contrast of colors, the male being gay and conspicuous and the female dull and obscure, the nest is open and the sitting bird exposed to view." This condition undoubtedly prevails in many cases, but the exceptions are so numerous and so important, that the "theory" fails of adequacy.

CHAPTER II

THE ANATOMY OF BIRDS

BY FREDERIC A. LUCAS

THERE are, broadly speaking, two sets of characters to be found in the skeleton of any animal. There are, first, those which bear a direct relation to its position in the class of vertebrates, bear witness to its origin and relationship, and are shared to a greater or less extent by every member of the group to which it belongs. These are termed structural or morphological characters.

There is also another set of characters which are connected with the animal's habits or mode of living and are believed to have been acquired during the development of the species, and are called secondary or teleological. It is owing to

FIG. 6. — Wing bones of a Bat.

FIG. 7. — Wing bones of a pterodactyl.

the fact that the skeleton is influenced by these two great factors that it is possible to tell from the skeleton, or even from parts of it, not only what position the animal holds in the scale of life, but what were its habits as well. So the modifications of a bird's skeleton are primarily morphological, those due to the fact that it is a bird, but these are associated with others rendered necessary by the adaptation

of the fore limb for flight and its consequent withdrawal from use in any other form of locomotion, or for taking food. And in birds these last so overlay the others that the classification of birds is a very difficult matter. This is well shown by the long use of the divisions Ratitæ and Carinatæ, which depended mainly on the presence or absence of a keel to the sternum, when this and a number of other characters depended upon whether a bird did or did not fly. So the structure of a bird's skeleton depends first upon the fact that it is a bird, secondarily upon the manner in which it moves about, and thirdly, to a still less degree, upon the way it gets its living. Flight in itself is not a distinctive character, for mammals fly to-day, and reptiles, in the shape of pterodactyls, flew ages ago, having successfully mastered the problem of flight about the time the bird had taken its first lessons in the art. But the manner in which the fore limb is modified, the ground plan, so to speak, on which it is built, is a primary morphological character and differs in the birds, mammals, and reptiles.

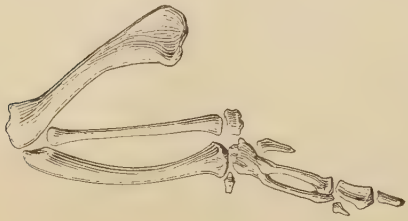


Fig. 8. — Wing bones of a Pigeon.

In the Bat (Fig. 6) the four fingers of the hand are greatly lengthened for the support of the membrane forming the wing; in the flying reptile (Fig. 7) the membrane is supported wholly by the enormously developed fifth or little finger. In the bird the bones of the hand are lessened in number and peculiarly modified for the attachment of feathers which form the highest type of wing.

The general characteristics of a bird's skeleton are lightness, length of neck, very decided difference between the fore and hind limbs, and reduction in the apparent number of bones of the hand and foot (metacarpals and metatarsals) by their fusion with one another. The skull joins the neck by a single condyle as in reptiles, and, also as in reptiles, the ankle joint is between the bones of the ankle and not between the leg and ankle as in mammals. The jaw is not attached to the cranium directly as in mammals, but by a free quadrate as in snakes and some extinct reptiles. In existing reptiles other than snakes the quadrate is fixed. Many ribs of the chest cavity bear little processes directed upwards and backwards, termed uncinate processes, and these are found in all birds save the Screamers, although almost wanting in the Secretary bird. Outside the class of birds such processes occur only in that curious New Zealand reptile, the Hatteria, and, in cartilage only, in Crocodiles. So, in many important particulars the skeleton of a bird resembles that of a reptile, and this led Huxley to unite the two in a common superclass, Sauropsida.

This possession of characters in common with reptiles is why it is considered that if birds have not been directly derived from reptiles, they have had a common origin. From the strong resemblances between birds and dinosaurs it was long thought that these reptiles were the parent stock of birds, but this theory has been practically abandoned.

Professor Seeley has thought that the resemblances between birds and pterodactyls was more than superficial, but he stands practically alone in this view, the most commonly accepted working theory being that birds and dinosaurs have had a common ancestry.

The extent to which the skeleton of a bird is permeated by air usually bears a direct and apparent ratio to its mode of life. Thus the Condor and other soaring birds, such as the Frigate-birds, Cranes, and Screamers, have very lightly built skeletons, and Ducks and other water fowls have the cavities of the long bones filled with marrow, while the bones of the strictly aquatic Penguins are filled with bony tissue.

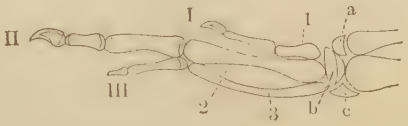


FIG. 9. — Wing bones of a young Ostrich. (After Parker.)

I, II, III, digits; 1, 2, 3, metacarpals; *a*, *b*, *c*, carpal bones.

That the lightness of the skeleton does not necessarily appear in connection with the power of flight is shown by the Hornbills and especially by the larger species, for in these birds of heavy, lumbering flight, the air penetrates to the very tips of the toes. On the other hand, in birds like the Condor and Frigate-bird this pneumaticity, or presence of air in the bones, is believed to aid in oxygenizing the blood and in adjusting the air pressure when a bird descends rapidly from a great height. It may also be connected with lessening the sudden shock that takes place when a Gannet or Brown Pelican plunges headlong into the sea.

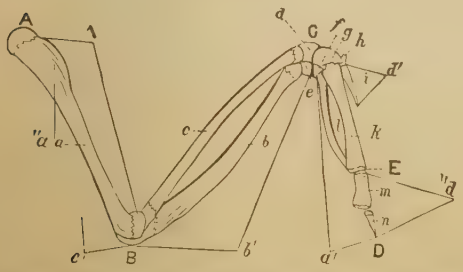


FIG. 10. — Wing bones of a young Chicken. (From Coues's "Key.")

A, shoulder; *B*, elbow; *C*, wrist or carpus; *D*, tip of third finger; *a*, humerus; *b*, ulna; *c*, radius; *d*, scapholunar bone; *e*, cuneiform bone; *f*, *g*, epiphyses of metacarpal bones *l*, *k*, respectively; *h*, metacarpal and its digit *i*.

It is usual to commence the description of a skeleton with the skull, but while the skull is of the utmost importance to the systematist, it is a complicated structure whose topography is by no means easy to understand, and whose numerous parts bear equally numerous and unfamiliar technical names. So we may slight this, leaving it to be briefly described later on, and begin with the wings, which, next to the feathers, are the most obvious features of a bird.

The wings of a bird comprise the same parts as the fore limb of a mammal or reptile, and save in the hand, we can readily recognize these various parts, the upper arm (humerus), forearm (radius and ulna), wrist, and hand.

The bones of the fore limb are modified for the support of the large feathers forming the wing, the hand being reduced to three fingers, while only two of these, those to which the primaries are fastened, are of much use.

The wrist of the adult bird, frequently called shoulder, consists of but two bones; the part corresponding to the palm of the hand comprises three metacarpals and two carpals solidly fused into one mass, though this can be seen only in a very young bird. Following this is a short finger on the front edge of the wing bearing the so-called bastard wing, one long central bone and one shorter more or less pointed. The stages by which the clawed hand has been transformed to a wing may be gathered partly from fossils and partly from a study of the embryo, but it is not quite certain whether the first finger of a bird, that bearing the so-called spurious wing, corresponds to the first or second finger of man, with the probability in favor of its being the second. The wing bones are lengthened or shortened in a pretty direct ratio to the rapidity with which the wings are moved, being longest in such sailing birds as the Albatross and shortest in the Pigeons and Hummingbirds. The shortening is greatest in the humerus; for while in the Albatross and Frigate-bird the upper arm and forearm are about equal, in the Pigeons the humerus is somewhat shorter, and in the Hummingbird very much shorter, than the succeeding bones. This relates to the fact that a bird's wing is a lever of the third order, with the shoulder joint representing the fulcrum, the muscle the power, the end of the wing the weight. The shorter the wing, the easier it is to move it rapidly; the more rapidly it is moved, the stronger must it be. The wing of a Condor or Albatross would break, were sufficient power applied to move it as fast as that of the Pigeon. The rapidity of the wing stroke is also indicated by the development of the processes about the inner end of the humerus for the attachment of wing muscles, these reaching by far their greatest development in Hummingbirds.

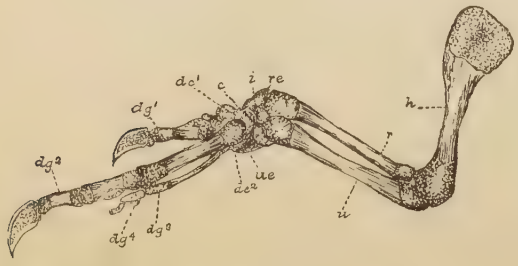


FIG. 11. — Wing bones of an embryo Hoactzin. (After W. K. Parker.)

Wing bones of an embryo Hoactzin, when the embryo was about half ripe for hatching, showing the claw on the first digit, dg^1; on the second digit, dg^2; the rudimentary claw on the third digit, dg^3; and the rudiment of a fourth digit, dg^4; *h*, humerus; *r*, radius; *u*, ulna; *re*, radiale; *ue*, ulnare; *i*, intermedium; *c*, centrale; dc^1, dc^2, distal carpals.

The wing is supported by the coracoid, a bone abutting on the front of the breast-bone and raking forwards and upwards. This bone, represented in the higher mammals by a mere process on the shoulder, forms half of the shoulder joint in reptiles and also in the Echidna and Platypus, and by far the greater part of the shoulder joint in birds, that part of the shoulder blade being much reduced.

In perching birds the coracoid is long and slender, and in birds which soar or sail it is shortened and broadened, for it is a rather curious fact that while the amount of muscular power employed in flight is much smaller in sailing birds than in others, the support for the wing is much more strongly built. In the

Frigate-bird, which is perhaps the most expert bird of flight, the area of wing muscle is proportionately smaller than in any other bird, while the wishbone is united at its apex with the breast bone and soldered to the coracoids at the other end, thus forming a rigid support for the wing. The shoulder blade is slender and as a rule more or less pointed, the Penguins being exceptional in having a broadly expanded scapula, while the Woodpeckers are characterized by having the end bent downwards. Attached to the coracoids in front is the wishbone, which represents the clavicles or collar bones of other animals. This is usually "U"- or "V"-shaped, with the apex near the keel of the sternum or even united with it, as in the Steganopodes. In some Parrots and Toucans the upper portions only of the clavicles remain attached to the coracoids, and in the struthious birds, save Emeu, clavicles are entirely lacking. In birds of prey the clavicles are broadly "U"-shaped and heavily built, serving to brace the wings apart, but in the majority of birds they are of little structural importance, and in such admirable flyers as the Hummers are practically of no use.

The breast-bone (Fig. 12), sternum, bears a direct relation to habits, and to a less extent is valuable in classification. While the terms Ratitæ and Carinatæ, keelless and keeled, are convenient in forming a key, and the corresponding conditions were formerly held of primary importance in classifying birds, they have been abandoned by the best anatomists, as they do not express the truth. The development of the keel of the sternum bears a direct relation to the extent to which a bird moves its wings, whether in flight or swimming. Birds which do not fly have the keel of the sternum small or absent, according as the power of flight has been lost, geologically speaking, for a longer or shorter period of time.

FIG. 12. — Sternum of a Guinea Hen, seen from in front. (After Gegenbaur.)

crs, crest; *c*, coracoid bone.

The members of the Auk family fly somewhat heavily, owing to the small size of their wings, but as these are used for flying under water as well as above it, the breast muscles and sternum are large. For the same reason the Penguins, which do not fly at all, have a large sternum, since they swim entirely with their wings, presenting in this respect an analogy to the eared seals, which swim with their fore limbs.

The keel of the sternum is very much reduced and the body of the sternum greatly shortened in birds which sail, this mode of flight involving the expenditure of comparatively little muscular energy. The Albatross has a small breast-bone, and the Frigate-bird smaller still, and these birds are those which fly with the fewest movements of the wing. On the other hand, birds that fly by strokes of the wings have large breast muscles and a correspondingly large sternum, these reaching their maximum in the Hummingbirds, whose skeleton when brought up to the size of a Pigeon is seen to be very powerfully built. The Pigeon, by the way, exhibits the development of the sternal keel for powerful flight.

The front part of the sternum bears the coracoids; the ribs are attached to its sides, while the body of it supports the viscera. In all water birds the breast-bone,

is long, corresponding to the long bodies of these birds. The hinder portion of the breast-bone may be entire, perforated, or notched, the notches being two or four in number, reaching their extreme in the fowls in which the body of the sternum is very small and the lateral processes extremely long and slender.

The front of the breast-bone (Fig. 13) may bear a projecting process, or "manubrium," and this may be developed from the inner face of the bone, *spina interna*, or outer, *spina externa*, at the region of the keel. The manubrium may be a spine (Curassows), or low projection (some Owls), while the extreme development is found in the long "Y"-shaped process so characteristic of the Passeres, the Woodpeckers coming next in this respect. These characters are apparently not associated with any corresponding modifications

FIG. 13. — Sternum of Sage Grouse, showing component bones. (After Shufeldt.)

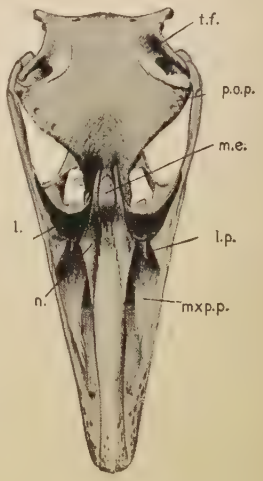


FIG. 14. — Skull of Rhea, dorsal view. (After Pycraft.)

t.f, temporal fossa; *p.o.p.*, postorbital process; *m.e.* mesethmoid; *l.p*, lachrymonasal pillar; *l*, lachrymal; *mxp.p*, maxillopalatine; *n*, nasal.

in the habits of birds, and are, therefore, of great importance in determining the affinities of various groups.

On either side of the breast-bone are little prominences to which the ribs articulate, and in many birds these articulations are found well forward and on a triangular-shaped process, termed the costal process.

The uppermost bone of the leg, the femur, is always short, even in wading birds, and usually pneumatic, or permeated by air. The extreme of shortness and width is found in the extinct diving bird Hesperornis, in which the femur suggests that of a seal.

The knee-pan, or patella, is usually small, except in such swimming birds as Cormorants and the extinct Hesperornis, where the head of the tibia is short, and it is largely developed to serve for the attachment of muscles. In Grebes and Loons the upper end of the tibia is greatly extended and the knee-pan correspondingly reduced, appearing as a small splint of bone back of the process.

The tibia is much the larger bone of the lower leg, the fibula being flat and splint like in character, never quite reaching the lower end of the tibia and commonly not extending more than two thirds of its length. The length of the tibia is related to a bird's habits, being longest in wading birds, coming next in runners, and of considerable development in swimming birds.

The foot of a bird never contains more than four toes, and there may be but two, as in the Ostrich, while the three principal metatarsal bones are united into one, with which the second row of tarsal bones is fused, this forming the tarsometatarsus, or, as it is

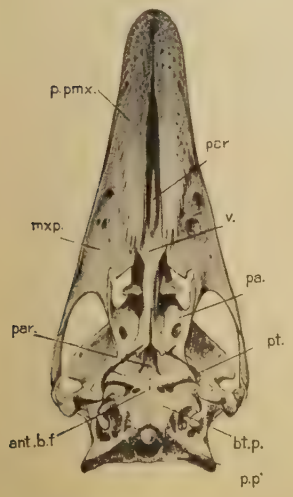


FIG. 15. — Skull of Rhea, ventral view. (After Pycraft.)

p.pmx, palatine process; *par*, parasphenoidal rostrum; *v*, vomer; *pa*, palatine; *pt*, pterygoid; *bt.p*, basipterygoid; *p.p*, paraoccipital; *ant.b.f*, anterior basioccipital fontanelle; *mxp*, premaxillary-palatine process.

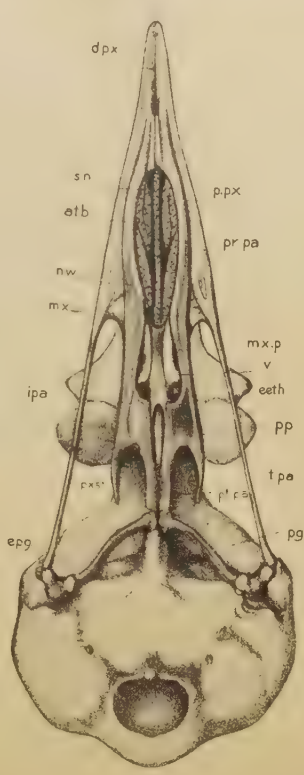


FIG. 16. — Skull of *Ptilotis*. (After Parker.)

p.px, palatal process of premaxillary; *pr.pa*, prepalatine; *mx.p*, maxillopalatine plate of maxillary; *v*, vomer; *eg*, pterygoid; *d.px*, dentary process of premaxillary; *mx*, maxillary; *ip.a*, interpalatine ridge; *p.as*, parasphenoid; *epg*, epipterygoid hook.

commonly called, tarsus. The bones corresponding to our heel bone, calcaneum, and its neighbor, astragalus, unite with the tibia, so that the ankle joint of a bird, like that of reptiles, is between the bones of the ankle, and not as in mammals between the leg and ankle.

The upper end of the tarsus and its relation to the tendons is a fair index to the position of its owner, being simplest in Ostriches and other birds undeniably low or generalized in character, and more complicated in higher forms, reaching

its greatest complexity in the perchers, in which the hypotarsus, as it is termed, is pierced for the passage of four or five tendons.

In the Crow, for example, there are four large and one small perforation, in the Clamatores but four, and one of these is closed by cartilage and not by bone; in the Picariæ there are but one or two tendinal perforations, and in the divers but one, so that the specialization of the tendons and that of the tarsus go together. The three divisions of the lower end of the tarsus indicate that it is composed of three bones, but these bones are clearly shown only in embryos, in young Ostriches and in Penguins, where the bones, though united, are plainly indicated throughout life, this retaining of a primitive condition being one of the characters which has led many good authorities to place the Penguins in a group contrasting with all other fan-tailed birds.[1]

The leg attaches to the hip-bone, or pelvis, each half of which is composed of the usual three bones, ilium, ischium, and pubis, although these fuse together at an early date and show as separate bones only in very young birds.

In all birds the pubis is directed backwards, and the greater part of the ilium lies in front of the hip-joint, this being a point where existing birds differ from existing reptiles. In the lower birds, as the Ostriches and Tinamous, the two principal bones of the pelvis, the ilium and ischium, are free from one another behind, this being a primitive character in which these birds resemble reptiles. The Cassowaries are an exception in having these bones united.

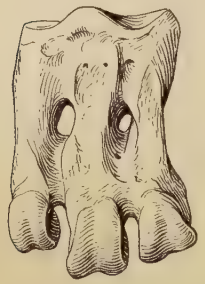


Fig. 17. — Right tarsus of Penguin, *Aptenodytes pennanti*.

In the vast majority of living birds (the Neognathæ) the ilium and ischium are firmly united. The pubic bones, the long, slender, lowermost bones of the pelvis, unite posteriorly in the Ostrich, but are free in other birds and are frequently widely separated; they may even be nearly lacking, as in Eagles, in which the hinder portions only remain. The outward flare and generally open character of the pelvis below has to do with the question of room for the passage of the large and brittle egg. Birds that fly much, and especially sailing and soaring birds like the Petrels and Frigate-birds, have a broad, short pelvis, while in water birds it is long and narrow, much the same condition being found in flightless birds which run much.

The neck vertebræ of birds are peculiar from the character of their articulations, which are saddle-shaped, concave one way and convex the other, a form termed heterocœlous, and one that allows great freedom of movement in both planes. Theoretically the ball-and-socket joint permits the greatest amount of motion, but in practice this form of joint is usually combined with some arrangement which checks its movements. Thus in the snake, while there is the utmost freedom of movement from side to side, there is but little play vertically. The neck of the bird is always long and the vertebræ numerous; this is

[1] Recently described fossils indicate that in the earlier Penguins, the metatarsals were not separated to the extent they are in existing species.

necessary in order that the bird may reach all parts of its body with the tip of its bill, and secondly, that it may obtain food. Thus long legs and long necks go together, or, as in the Sandpipers and Snipe, there is an increase in the length of the bill, while Swifts, Swallows, and Goatsuckers, which capture their prey in mid-air, have short necks. Swans, which do not dive, have much longer necks than diving birds, or Geese, which feed largely on land. The very long neck of the Darter is associated with its habit of suddenly straightening the neck and impaling fish on its sharp bill.

Usually the last two neck vertebræ bear free ribs, these being but the lengthening and freeing of the long processes running backwards from the sides of the front of the vertebræ. That these are really ribs may be readily seen in a young Ostrich, in which they are free, but while later on they become united with the bodies of the vertebræ, the last two remain free, although they do not reach the sternum.

The thoracic region of a bird, the body proper, usually consists of a comparatively small number of vertebræ bearing long ribs, the foremost of which are attached to the sides of the breast-bone. Water fowl, like the Loons, Auks, and to a lesser degree Ducks, have the longest bodies, soaring birds the shortest. Several of the vertebræ in the center of the series are fused or ankylosed together to stiffen the body for flight, a free vertebra or two next the pelvis permitting some motion here.

The sacral vertebræ, or those to which the pelvis is attached, are really but two, as in reptiles, or in rare cases three in number, but in front and behind are added vertebræ from the back and tail region, the result being a long series of vertebræ firmly united in one mass and furnishing ample attachment for the pelvis and a firm support for the legs. The number of bones in this synsacrum, as it is called, can only be clearly seen in young birds, but there may be from twelve to as many as twenty.

Finally comes the caudal series of free tail vertebræ, which may vary from five to as many as ten, the average number being about six, and in all the higher birds, or Neognathæ, terminating in the flattened urostyle, to which the tail feathers are attached. This bone in turn comprises four to six modified sections.

The skull of a bird, roughly speaking, is divided into two parts, the beak and brain case. The beak portion, which is very directly concerned in the getting of food, is subject to many and great modifications; the rear portion, being away from direct modifying influences, is less altered, and here the palatal part of the skull is of the most importance for purposes of classification, for the less a part is subject to outside influences and the less a creature's habits have to do with any part of the body, the less, theoretically at least, should that part be subject to modification, and the more important it is for use in classification.

There are two existing types of skull structure by which birds are divided into two great groups, the Palæognathæ or Dromæognathæ, including the Ostriches and their allies, and the Neognathæ, Euornithes, or Eurhipiduræ, which comprise the vast majority of birds. These types are sharply marked, indicating that at the very outset of their career, birds split into these groups, if indeed they may not

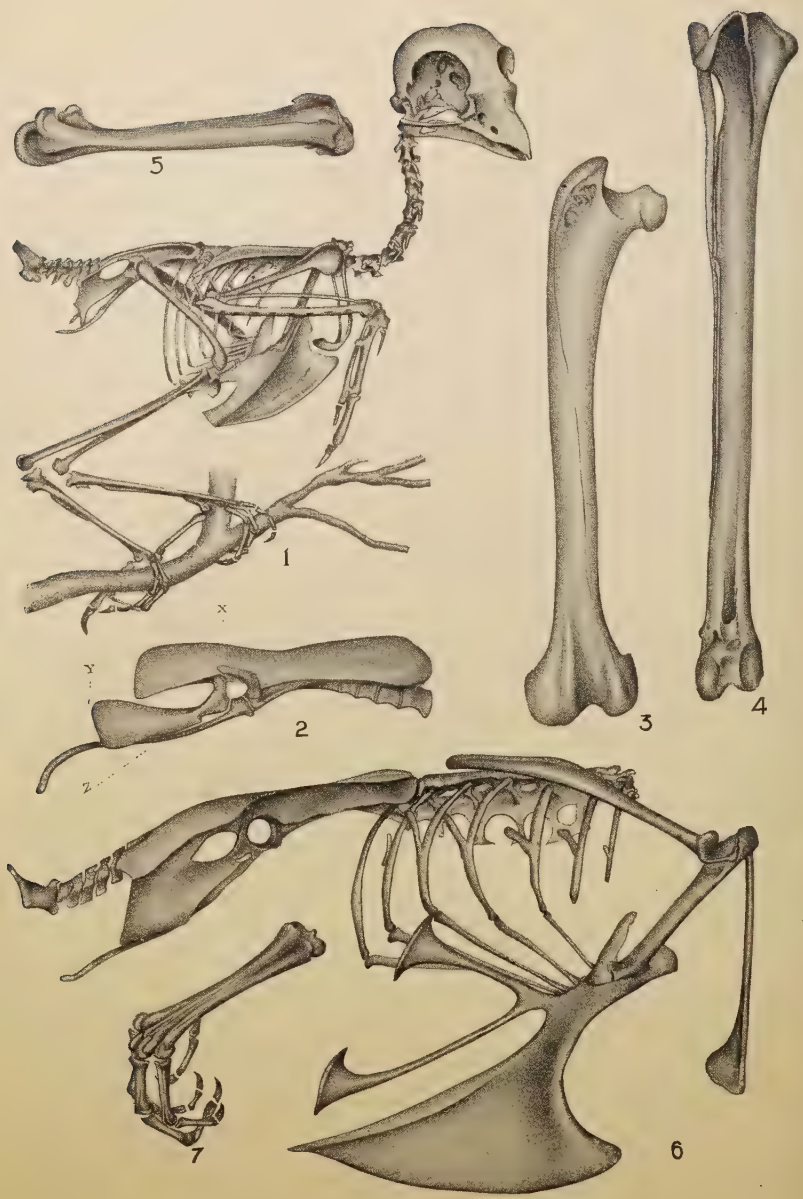


FIG. 18. — Anatomical plate. (After Shufeldt.)

1, skeleton of typical passerine bird, the White-rumped Shrike (*Lanius ludovicianus excubitorides*); 2, pelvis of young Sage Grouse (*Centrocercus urophasianus*); *x*, ilium; *y*, ischium; *z*, pubis; 3, anterior view of right femur of Sage Grouse; 4, anterior view of right tibia and fibula of adult Sage Grouse; 5, tarsometatarsus of adult Sage Grouse; 6, thoracic and pelvic bones with scapular arch of White-tailed Ptarmigan (*Lagopus leucurus*); 7, foot of young Sage Grouse showing free centrale and indications of the three component tarsals.

have originated from two distinct types of reptiles. Unfortunately, as previously noted, these modifications can be described only in technical language and can probably be best understood from a study of the accompanying figures.

In the dromæognathous type of skull (Figs. 14, 15), so called because it is typically found in Ostriches, the vomer is broad and unites in front with the maxillopalatines, while behind it receives the posterior extremities of the palatines and the anterior ends of the pterygoids, which are thus shut out from joining the sphenoid; the sphenoid bears on its sides long basipterygoid processes which give it something of a cruciform shape. In birds with this type of skull the quadrate, the bone to which the lower jaw is joined, is rather short and clumsy and its articular head is single or but faintly divided into two portions; the quadrate is also locked into place by the surrounding bones. In all these particulars the dromæognathine skull more nearly resembles that of a reptile than does that of the majority of birds, a point that may be best appreciated by comparing the figures.

In the euornithic type of skull (Fig. 16) the palatines articulate with the pterygoids and both touch the sphenoid at their point of junction, and the back of the vomer embraces the sphenoid between and above the ends of the palatines. The quadrate has two heads and is loosely joined to the cranium. This arrangement prevails in the majority of birds, and is termed the euornithic type of skull because it is characteristic of the Euornithes; it is also called neognathic because it is believed to be more recent or newer than the Ostrich style and further removed from the reptilian skull.

Basipterygoid processes may be present, but usually in the form of low facets which articulate with projections on the pterygoids and often serve as braces to the beak when this is slightly movable, as in Ducks and Parrots.

The neognathous style of skull is subject to several important modifications which characterize great natural groups of birds. These are the schizognathous, desmognathous, and ægithognathous types,[1] which may be briefly characterized as follows: When the vomer is pointed in front and entirely free from the maxillopalatines, and these are free from each other, the skull is termed schizognathous; when the maxillopalatines are expanded and fused with each other, the vomer being small or absent, the skull is desmognathous; when the vomer is expanded in front and free from the maxillopalatines, and these are slender at their point of origin and disjoined, the skull is said to be ægithognathous.

The second of these types, the desmognathous, is to some extent a modification of the first, brought about by the development of bone in the palatal region which binds the various parts together and hides its real structure. Thus desmognathism occurs in varying degrees in birds obviously closely related, while the transformation of one type of skull into another is admirably illustrated by the Cormorant. This bird has at first a schizognathous skull, but by the time it takes

[1] Parker applied the term saurognathous to the skulls of Woodpeckers, but in the opinion of the writer and others, the modifications found in the skulls of these birds are largely, if not entirely, mechanical and depend on the use of the skull as a pick. To a lesser extent and for similar reasons some of the features are present in the skull of the Nuthatch.

to the water, growth of bone in the palatal region has converted it into a completely desmognathous cranium.

Two other features remain to be considered in connection with the skull, the hyoid, and those modifications of the nasal bones and narial openings termed by Garrod holorhinal and schizorhinal. In the holorhinal type the openings are

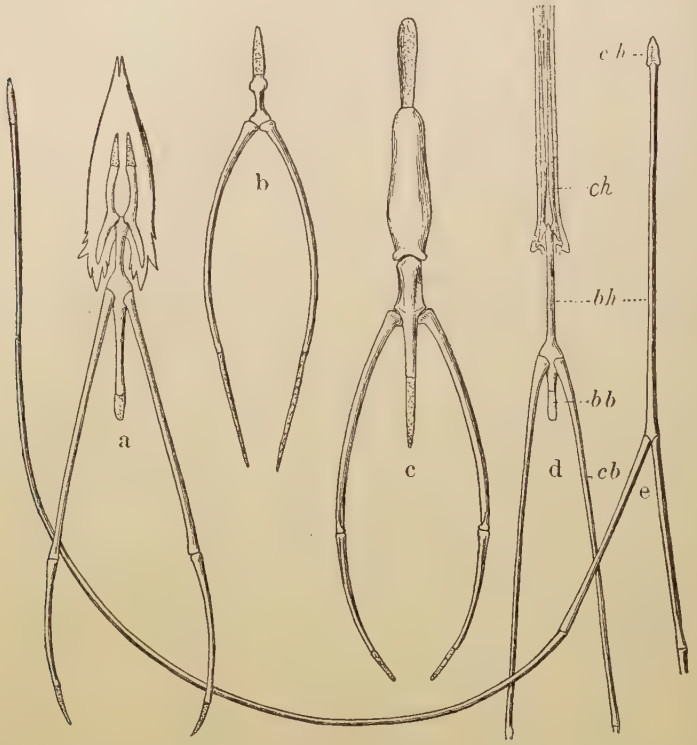


FIG. 19. — Tongue and hyoid bones of various birds. (After Lucas.)

a, hyoid of Pewee (*Sayornis fuscus*); *b*, hyoid of Cormorant (*Phalacrocorax urile*); *c*, hyoid of Muscovy Duck (*Cairina moschata*); *d*, hyoid of Hummingbird (*Selasphorus rufus*); *e*, hyoid of Flicker (*Colaptes auratus*). All figures drawn to the same absolute scale. *ch*, ceratohyal; *bh*, basihyal; *bb*, basibranchial; *cb*, ceratobranchial.

more or less oval, the posterior border curved and lying in advance of the posterior ends of the premaxillaries. In the schizorhinal type the openings are more or less elongate, with the posterior border angular or slit-like and lying back of the posterior ends of the premaxillaries.

These features are, to some extent, valuable in classification, but by no means of the importance at first ascribed to them by Garrod, being one of the many emphatic warnings that birds may not be classified by any one set of characters, but by the resultant of many.

The beak part of the skull, as just stated, is subject to great modifications connected with the taking or manipulation of food, and may be long and slender like a probe, broad and flat, or short and strongly made for crushing seeds. The extent to which habit and modification may go is shown in the Pelican, Gannet, and Cormorant, and in all these diving birds the nostrils are completely filled up and the roof of the mouth strengthened by the growth of the bone.

The Cormorant starts in life with open nostrils, but by the time it is ready to take to the water and seek food for itself, the nostrils are completely closed by the growth of bone and overlying horny beak. These changes are accompanied by others in the bones of the palate by which the structures of this region are entirely changed and its real characters obscured.

The hyoid, all but the front portion, corresponds with the first gill arch of a fish and supports and controls the motion of the tongue. The tongue itself is built upon the front portion of the hyoid, which is subject to little modification, but the extent to which the tongue can be protruded depends on the length of the bones of the hinder part. Hence in the Woodpeckers, which use their tongues as probes, the hinder parts of the hyoid curl up around the back of the head and may even, as in *Colaptes*, pass over and into the nasal chamber nearly to the tip of the beak. Thus from bill to toes, not merely the external form of the bird, but the underlying skeleton as well, is fashioned to adapt the bird to its surroundings. As William Kitchen Parker used to say, "Adaptation, adaptation is the keynote to the structure of a bird."

CHAPTER III

THE GEOGRAPHICAL DISTRIBUTION OF BIRDS

THE distribution of life over the globe is known as biogeography. With that branch of the subject dealing with the distribution of animals (zoögeography) we are of course at present only concerned with the distribution of birds. Although earlier attempts had been made to correlate certain observed facts of avian distribution, it was not until about the middle of the last century that the subject was placed on a logical and scientific basis. These earlier attempts failed because it was undertaken to delimit life areas by degrees of latitude and longitude, or by the lines of political division, while in the light of present understanding it needs but a moment's reflection to disclose the fact that the distribution of life on the earth must depend upon natural causes and conditions, and only occasionally and quite by accident to coincide with the political divisions.

Inasmuch as most birds possess the power of flight, which enables them to pass easily and quickly from one area to another, or, within certain limitations, even from one hemisphere to another, it might be inferred that their distribution would be relatively uniform, but such is far from being the case. If a person reasonably familiar with the bird life of eastern North America should journey around the world, first crossing this continent, and thence by way of Central America through South America, and by way of Polynesia to New Zealand, Australia, Asia, Europe, and Africa, he could not fail to be impressed with the marked differences in the birds coming under notice. In a few cases, such as afforded by the pelagic and far-wandering Albatrosses, Petrels, Gulls, Terns, and Tropic-birds, he might find the same species at several widely separated points in the journey; in many instances he would note the presence of familiar groups, — as Ducks, Woodpeckers, Kingfishers, Hawks, Owls, — but in the vast majority of cases the species would be entirely different, while in not a few, whole families and orders would appear and disappear in succession.

It is not always easy to account for the presence or absence of certain genera or other groups of birds in this or that part of the world, especially when it appears that the conditions of environment in localities whence they are absent are apparently similar to those obtaining where they are present, and were it not for the aid rendered by geology and paleontology we should often be left without an adequate explanation. It is no doubt true that certain groups of birds now

confined to circumscribed areas could exist as well in other parts of the world where climatic and food conditions are practically similar, provided the avenues for reaching them were open. For instance, the abundant fresh water bodies of the New World, teeming with fishes and other aquatic life, seem admirably adapted to support a varied Kingfisher fauna, and doubtless our Troupials (*Icteridæ*) could change places with the Old World Starlings (*Sturnidæ*), or our Wood-warblers (*Mniotiltidæ*) with the Old World Warblers (*Sylviidæ*). These groups, and of course many others could be mentioned, appear to have reached their present standing in approximately the same geographical areas they now occupy, and long since all land connection between their respective habitats has been cut off.

In the light of geological evidence it is beyond dispute that in the past numerous large land masses have been many times joined together and many times rent asunder. In this way continents as well as lesser land areas have been successively joined and cut off from one another, and each junction has left the way open for an exchange of life forms. North and South America have been many times severed and united; Australia by a relatively slight subsidence has lost New Zealand, and Madagascar was undoubtedly at one time a part of the continent of Africa. Both New Zealand and Madagascar were stocked with certain animal forms while they retained connection with their parent masses which the sea barrier has since prevented from commingling, at least to any great extent. The important bearing of these facts on distribution is obvious.

Another and very important geological event was the glacial epoch. This vast ice-mass, sweeping down for hundreds of miles from the pole, profoundly modified the life, not only in the area actually covered by the ice, but far beyond its actual border. Many forms must have been crushed out of existence, while others, enjoying perhaps better means of migration, were pushed before it towards the tropics, which resulted in intensifying the struggle for existence in an area probably already well stocked. The forms of life from both sources that could not readily adapt themselves to the changed conditions were pushed to the wall and left little or no trace of their existence. By the recession of the ice, territory was gradually reclaimed, which was occupied by the surviving forms, with the exception of those typically northern forms remaining permanently stranded in southern mountain areas.

To paleontology we are also indebted for some contributory data regarding distribution, for while the fossil remains of birds are not very numerous, they are often sufficiently so to show that many groups once enjoyed a much wider distribution than now. Paleontology thus makes plainer the possible lines of travel by which the descendants of the ancient forms have reached their present locations. But this class of facts is far less important than those last considered, for the paleontological record is less complete for birds than for almost any other group. It is mainly of value in fixing the antiquity and affinities of certain groups, and even here it is often distressingly meager.

Of the causes controlling or influencing distribution it is generally admitted that temperature and humidity are the chief factors, and, according to Merriam,

"it has been found in the case of mammals and birds that the effects of temperature, estimated numerically, are more than three times greater than the effects of humidity upon genera, and many times greater upon the higher groups." While there is some difference of opinion as to the exact period during which temperature exerts the greatest influence, "there can be but little doubt that for both animals and plants it is the season of reproductive activity."

There are various other factors, aside from those already mentioned, that are known to exert a greater or less influence on geographical distribution. The character of the soil, which carries with it an effect on the plant and insect life, may be mentioned, as well as the mechanical purity of the atmosphere as evidenced by the prevalence of fogs, etc. Deforestation, the usual mark of the advent of civilization, has quite markedly affected distribution, and the extension of cultivated areas by means of irrigation over lands previously arid has increased the habitable areas for some species, and has also resulted in displacing many indigenous forms. Mountain ranges have often been considered to be efficient barriers against distribution, and that they have an effect is true, but it is mainly the effect of altitude and temperature; for if conditions are similar on opposite sides of a range, they will usually be found inhabited by the same forms, which may have reached these positions by passing around the extremities of the mountains or by means of passes through them. The real barrier is climate and not mass. Thus both sides of the Rocky Mountains as well as the high Sierra in California, are found to be inhabited by the same species of birds, and, says Merriam: "The great Himalaya has little or no influence in bringing about the really enormous differences that exist between the faunas and floras of the plains on its two sides, for these dissimilarities are due primarily to the great difference of temperature resulting from unequal base level, the Thibetan plateau on the north being several thousand feet higher than the plain on the south."

Oceanic bodies of water have of course a powerful effect on distribution, especially of land birds, but even here certain limitations must be borne in mind. To purely terrestrial animals the presence of even a moderate width of open water may prove an efficient barrier, but to birds, endowed as they are with the power of flight, it is less so than might be supposed. The Galapagos Islands lying six hundred miles off the coast of Peru have been stocked with an abundant fauna of land birds, evidently of South American and West Indian origin, and the Azores, seven hundred miles distant from South Europe, have a fauna of one hundred and twenty species and subspecies of birds, all Old World forms, the ranks of which are being yearly augmented by fresh arrivals. Within the last fifty years the White-eye (*Zosterops cærulescens*), a small passerine bird about the size of our Parula Warbler, has crossed over the twelve hundred miles of open water separating Australia from New Zealand, and has extensively and permanently colonized the latter; the European Widgeon and Ruff have again and again been found in the middle and western United States, and the American Catbird has been taken in Italy. Examples of this erratic wandering, or apparently regular journeying, might be continued almost indefinitely, but enough has been given to show that the sea is not an insuperable barrier in all cases.

It has been found possible to divide the land-masses of the world into a number of faunal (and floral) areas, each of which is more or less strongly characterized by the presence or marked absence of certain dominant or peculiar forms of life. The failure of early attempts at such delimitation was due, as already pointed out, to the effort to make them conform to the lines of political division, or to degrees of latitude and longitude; and while naturalists are even now not in accord as to the number of primary divisions that should be recognized, Mr. P. L. Sclater was the first to put the subject on a scientific basis by applying to it a logical principle. The contention that "convenience, intelligibility, and custom should largely guide us" in prescribing life areas has long been discredited, for it is now obvious that the mere size of an area can have no real weight so long as it is sufficiently characterized. It should not be inferred, however, that these life areas, whatever their size and grade, are always sharply circumscribed by hard and fast lines; for while it is possible to define them with considerable definiteness in a general way, it rarely happens that a change from one to another is abrupt. Perhaps the most notable example of a sharp line of demarcation is that passing between the islands of Bali and Lombok and separating the Australian and Indian Regions. There is usually an area of greater or less width in which there is a commingling of the life forms of adjacent divisions, a neutral ground or transition area, as it is called. On the whole, however, it is found that these lines correspond quite closely to isothermal lines, or the lines of equal temperature.

Sclater demonstrated that the surface of the globe exhibited six great divisions, each of which differed in a marked manner from all the rest, though the difference was not always equally important. These divisions, which he called Regions, are as follows: Palæarctic, Ethiopian, Indian, Australian, Nearctic, and Neotropical. For upwards of twenty-five years most writers on the subject accepted this classification with little change, though the conviction slowly gained ground that the distinction between the fauna of the northern portions of the Old and New Worlds was not as pronounced as had been thought. In 1893 Dr. J. A. Allen proposed a new classification, denominating the divisions of the first rank Realms, while those of second rank were called Regions, those of the third rank Provinces, of the fourth rank Subprovinces or Districts, and those of fifth rank Faunas. He recognized seven Realms: Arctic, North Temperate, American Tropical, Indo-African, South American Temperate, Australian, and Lemurian. In the same year Professor Alfred Newton proposed an arrangement which retained the number of Regions recognized by Sclater, but their outlines were very different. They are as follows: New Zealand, Australian, Neotropical, Holarctic, Ethiopian, and Indian, and while in some respects it seems somewhat less logical than Dr. Allen's, it is more conveniently followed here.

The New Zealand Region. — There has been considerable discussion as to the propriety of considering this as a life area of primary rank, but notwithstanding the fact that it is by far the smaller of the areas usually so considered, it is sufficiently well characterized to warrant this distinction, and in fact cannot well be referred to any other Region. Regarding the matter of size it may be

pointed out that while it is now restricted, if it is considered with relation to its dependent islands — Norfolk, Lord Howe's, and Kermadec Islands on the north, Chatham Islands on the east, and Auckland, Macquarie, and Antipodes groups on the south — which were once undoubtedly a part of it, it is seen that the area is but little short of that of Australia. This New Zealand area was set off from Australia by subsidence at a remote period, geologically speaking, and has apparently remained continuously separated. As might be supposed, this early separation and continuous isolation has resulted in developing or perpetuating some very remarkable life forms. It is, or rather was until recently, the home of two perfectly distinct orders of birds, the *Dinornithiformes*, or Moas, and their allies, embracing two families, some seven genera, and about thirty nominal species, and the *Apterygiformes*, or Kiwis, of which there are six species.

The Australian Region. — This Region, says Newton, "has but little connection with New Zealand and is as trenchantly divided from the Indian, which geographically, and possibly geologically, seems to be conterminous with it, by the narrow but deep channel that separates the small islands of Bali and Lombok, and will be found to determine the boundary between these two distinct Regions." Starting with an imaginary line between these two islands, we may trace it northeasterly, passing between Borneo and Celebes, and between the Philippines and the Pelew group. Thence the line proceeds northward to the vicinity of the Tropic of Cancer, and then eastward somewhat indefinitely so as to include the Hawaiian Islands, though these are perhaps more North American, but to include all of which is commonly called Polynesia, and return so as to encompass the New Caledonian Islands and of course Australia proper as well as Tasmania.

Without going as extensively into the subject as is really warranted, it may be stated that the Australian Region is the exclusive home of the order *Casuariiformes*, comprising the Cassowaries and Emeus, the superfamily *Pseudoscines*, which embraces the families *Menuridæ* (Lyre-birds) and *Atrichornithidæ* (Scrub-birds), and the families *Rhinochetidæ* (Kagu), *Didunculidæ* (Tooth-billed Pigeons), *Loriidæ* (Lories), *Paradiseidæ* (Paradise-birds), and *Ptilonorhynchidæ* (Bower-birds). In addition to these the following families are almost peculiar: *Meliphagidæ* (Honey-suckers), *Campephagidæ* (Cuckoo Shrikes), *Artamidæ* (Wood-Swallows), *Cacatuidæ* (Cockatoos), and *Megapodidæ* (Mound-builders). As it is oftentimes nearly or quite as important to note the groups that are wanting in an area as it is to determine those which are present, it may be noted that the Australian Region lacks the families *Vulturidæ* (Vultures), *Phasianidæ* (Pheasants), and *Pycnonotidæ* (Bulbuls), to which should perhaps be added the *Fringillidæ* (True Finches), though the exact relationship of the so-called Australian Finches can hardly be considered as settled. The *Picidæ* (Woodpeckers) are practically absent, as hardly half a dozen species cross the line into Lombok, Celebes, or the Moluccas, but do not occur elsewhere.

The Neotropical Region. — The present Region comprises the whole continent of South America as well as Central America and the West Indies, extending as far north as the southern line of the Holarctic Region, which will be defined later. Although there are no life forms in common between the two last-mentioned

Regions and the present, there is a certain alliance, as was long ago suggested by Professor Huxley, though of quite a different nature from any thus far considered. "South America, that is to say the most important part of the Neotropical Region, retains a greater proportion of the less modified descendants of generalized ornithic types than does any other portion of the globe, the two Regions before mentioned only excepted." - NEWTON. In other words, this area appears to have been more or less completely isolated for a very long period of time, and as a result a large proportion of the archaic elements have been retained, albeit in modified form. Among the birds, then, we find a large number of peculiar types, including the orders *Rheiformes* (Rheas) and *Crypturiformes* (Tinamous), and some twenty-seven families or subfamilies, as follows: *Procniatidæ* (Swallow-Tanagers), *Cœrebidæ* (Honey Creepers), *Zeledoniidæ* (Wren-Thrushes), *Catamblyrhynchidæ* (Plush-capped Finches), *Ptilogonatidæ* (Silky Flycatchers), *Dulidæ* (Palm Chats), *Oxyruncidæ* (Sharp-bills), *Pipridæ* (Manakins), *Cotingidæ* (Cotingas), *Phytotomidæ* (Plant-cutters), *Dendrocolaptidæ* (Wood-Hewers), *Formicariidæ* (Ant-birds), *Pteroptochidæ* (Tapaculos), *Rhamphastidæ* (Toucans), *Bucconidæ* (Puff-birds), *Galbulidæ* (Jacamars), *Todidæ* (Todies), *Momotidæ* (Motmots), *Steatornithidæ* (Oil-birds), *Cracidæ* (Curassows), *Opisthocomidæ* (Hoactzin), *Chionidæ* (Sheath-bills), *Thinocoridæ* (Seed-snipe), *Cariamidæ* (Cariamas), *Aramidæ* (Courlans), *Psophiidæ* (Trumpeters), *Eurypygidæ* (Sun-bitterns), *Palamedeidæ* (Screamers).

In addition to the above-mentioned peculiar forms the following families are mainly Neotropical, only relatively few species crossing the line into the Holarctic Region: *Icteridæ* (Troupials), *Tanagridæ* (Tanagers), *Tyrannidæ* (Tyrant-birds), and *Trochilidæ* (Hummingbirds).

The Holarctic Region. — Notwithstanding the fact that this vast Region is, area for area, much larger than all the others combined, it is the most difficult to satisfactorily define. Even the outlines are still open to question in many places, and can be given only approximately. In the New World the southern line of the Holarctic Region has been worked out with considerable detail, being in fact the northern line of the tropics. Starting on the Pacific coast, it crosses the lower portion of the peninsula of Lower California, thence crossing to the Mexican mainland it skirts the mountains and passes over into the Atlantic drainage in southern Mexico, when it bends northward to leave the continent in extreme southern Texas just above the mouth of the Rio Grande. Crossing the Gulf of Mexico, it excludes a portion of southern Florida and the Bermudas and touches the African coast about the vicinity of Mogador, where its course is clear, for it follows the northern limit of the Great Desert. As regards its extension across the Asiatic continent to the Pacific we may accept the recent statement of Mr. H. E. Dresser, who supposes it to "run to the northward of the Arabian Desert, and including the tableland of Persia, the highlands of Baluchistan, the whole of Afghanistan, and the Himalayan Range above about 6000 feet, stretching to the south of Tibet, and north of the valley of Yang-tse-kiang as far as the Pacific, and then around Corea, and the main islands of Japan."

The Holarctic Region may be divided into two major areas (denominated

Regions by Sclater), called the Nearctic for that portion embraced in the New World, and Palæarctic for the Old World portion. In the entire Nearctic area there is but a single peculiar family of birds, the *Chamæidæ*, or Wren-tits. All the other Nearctic families are common to the Neotropical Region or to the Palæarctic area or to both. This condition of affairs also prevails in the Palæarctic area, for of the twelve or thirteen hundred species of birds inhabiting it, there is not a single family that is absolutely peculiar to it. For the proper characterization of this Region we must consider the genera, but the presentation of these data in sufficient detail to become intelligible would take us quite beyond the limits of the space available.

The Ethiopian Region. — This comprises all of the continent of Africa below the northern border of the Great Desert, together with much of Arabia and the extreme southern portion of Persia. There is some doubt as to the propriety of including the great island of Madagascar, as some naturalists — notably Dr. Allen — would accord it primary rank, and there can be no doubt that it possesses some remarkable life forms. The closest affinity of the Ethiopian Region appears to be with the Indian Region which touches it on the east, and Dr. Allen has combined the two areas as the Indo-African Region. Among the many interesting birds at least the following groups are peculiar: Orders *Struthioniformes* (Ostriches) and the extinct *Æpyornithiformes* (Elephant-birds), the suborders *Gypogerani* (Secretary-bird), and *Mesœnatidæ* (Mesite), the superfamily *Scopidæ* (Umbrette), and the families or subfamilies *Balænicipitidæ* (Shoe-bill), *Musophagidæ* (Plantain-eaters), *Leptosomatidæ* (Kirumbos), *Coliidæ* (Colies), *Philepittidæ* (Asitys), *Hypositttidæ* (Coral-billed Nuthatch), *Vangidæ* (Vanga Shrikes), *Ærocharidæ* (Helmet-bird).

The Indian or Oriental Region. — This, the last of the six Regions to be defined, is bordered by the Ethiopian region on the west, the indefinitely outlined Holarctic Region on the north, and the rather sharply circumscribed Australian Region on the east. While this Region is the home of a large number of peculiar genera and species, there appears to be but a single peculiar family; namely, the *Eurylæmidæ*, or Broad-bills.

CHAPTER IV

THE MIGRATIONS OF BIRDS

THE sudden appearance of certain familiar birds in spring and their disappearance at the close of summer has excited the attention and interest of all classes of observers from the earliest times. "The stork in the heaven," says the prophet Jeremiah, "knoweth her appointed time; and the turtle and the crane, and the swallow observe the time of their coming." Much curious speculation has been indulged in to account for this periodic appearance and disappearance, one ingenious writer of the early part of the eighteenth century arguing that when the birds leave in the fall they retire to the moon. He presumed that they required about two months in passing thither, and that, after arriving above the lower regions of the air they will have no occasion for food. Concerning the great distance, he adds, "Between the moon and the earth, if any shall still remain unsatisfied, I leave only this to his consideration, whether there may not be some concrete bodies at much less distance than the moon, which may be the recesses of these creatures, and serve for little else but their entertainment," just as the rocky islands of the sea which he says are "of no other manifest use than for sea fowl to rest and breed upon"!

Hardly less absurd but wonderfully more persistent has been the notion that birds hibernate during the winter in hollow trees, caves, and holes, and, at least in the case of Swallows, in the mud at the bottoms of lakes and ponds. Linnæus and Cuvier, as well as a great number of lesser lights, believed that Swallows spent the winter in a torpid state in mud, and even as late as 1878 a writer in a prominent natural history journal in this country described the finding, in midwinter, of two Swallows in the mud at the bottom of a spring in a logging camp in Maine. When taken out they are said to have revived and to have flown about in a warm room. For the benefit of those who still hold this view — and there are such — it may be acknowledged that we do not yet know the winter home of our Chimney Swift, Bank Swallow, and Cliff Swallow, though it may be added that when they return to us in spring they have enjoyed a complete moult, which would seem to be a sufficiently severe strain without the addition of a winter spent in a state of torpor!

These absurd ideas have gradually given way to more rational views, and at the present time the whereabouts of a great majority of our birds is known accurately for the entire year. Their coming and going on these long journeys has been under intelligent, though often desultory, observation for more than a century and, although we have learned much, it seems likely that we are hardly advanced beyond the borderland of this intricate and fascinating subject.

In the first place, it may be well to define briefly certain phases of bird movement that are often overlooked or confounded with the generally accepted understanding of what migration covers. In the popular mind, and, it may be added, this is the correct view, a migratory species is one that regularly resorts to a given locality for the purpose of rearing its young, after which both old and young retire to some other, often widely different locality, where they pass the time before the next breeding season. In all temperate countries the migratory birds may be separated along these lines into two classes: first, those which come in spring, spend the summer, and retire towards autumn; and second, those which pass through in spring to a breeding ground nearer the pole, and in the fall while on their journey south. The distinction between these two classes is obviously one of degree rather than kind.

The birds that come to us only in winter, such as Juncos, Snowflakes, Redpolls, and Lapland Longspurs, are not usually thought of as migrants, yet it requires but a moment's reflection to show that they are strictly so, and this leads to the general proposition that most birds throughout the world are constantly changing their location, but, as the individual is merged in the species, it is often difficult to obtain exact data on the subject. Because we see individuals of a certain species constantly about us, we call that a resident species, but, as a matter of fact, it is more than likely that not the same individuals are continuously under observation.

There is also another class known as occasional visitors, as the Pine Grosbeak and Snowy Owl, which may be absent for years, then of a sudden appear in great numbers. Their coming is supposed to be the result of a deficient food supply in their natural habitat far to the north, but the evidence for this is theoretical rather than actual. Hardly to be distinguished from these occasional visitants are the sudden incursions of species in a locality in which they have never been before known, as when a vast horde of Nutcrackers spread over all Europe in 1844, or the erratic Sand Grouse, a bird of Central Asia, which has penetrated to England. But the climax of this restless and roving tendency in birds is reached in the stragglers that now and then are found hundreds, even thousands, of miles away from their homes, as when the Old World Skylark is found in Greenland and the Bermudas, the American Black-billed Cuckoo in Italy, and our Catbird and Brown Thrasher in Europe. While it may not be quite logical to class all these bird movements under the head of migration, as narrowly defined, they are more or less clearly manifestations of the same influences and go to make up the sum total of this wonderful ebb and flow of bird life.

The origin, or perhaps better the origins, of this habit or instinct of bird migration is exceedingly obscure. Many theories have been advanced to account for it, but perhaps none has yet been offered that explains satisfactorily all its multitudinous phases. For instance, it has been suggested that migration is the result of the development or acquirement of the power of flight. That flight has had much to do in making long extended migrations easily possible no one can deny, but that it has been the cause is not logically evident, for certain mammals, as the bison and antelope, are to a limited extent migratory, and cer-

tain flightless birds, as the Penguins and the Great Auks, are strictly so, or rather were in the case of the latter species which is now extinct.

According to Mr. F. M. Chapman ("Bird Studies with a Camera," p. 194) "the desire for seclusion during the breeding season" is a "good and sufficient cause for the origin of bird migration." He applies this theory especially to birds nesting in colonies in secluded spots, as the Ipswich Sparrow, which is known to nest only on Sable Island, off the Nova Scotia coast, the Gannets (*Sula bassana*), which nest in the western hemisphere only on three islets in the Gulf of St. Lawrence, Terns on Muskeget and Penikese, and the Brown Pelicans of the Indian River region of eastern Florida.

This theory may afford an explanation for the migrations of birds that congregate in such colonies during the breeding season, but it should not be overlooked that "survival of the fittest" may have been an equally important factor in weeding out those individuals of such colonies that did not seek these secluded or isolated localities for breeding sites. These birds may at first have nested in scattered situations and have been driven by predatory animals or other causes to seek inaccessible locations, and seclusion and isolation may thus have been a resultant rather than a cause. It is also difficult to apply this theory to land birds. Take, for example, the Warblers of the genus *Dendroica*. Some species barely reach the United States during the nesting season; a few stop in the southern tier of states; others only reach to southern New England, while the bulk of the species press on from northern New England to Hudson Bay. If seclusion were the only point aimed at, it would seem that the Warblers which pass farthest north to breed could have found it in the mountains of the southern and middle states as some now do. Again, certain species, as the Cliff and Barn Swallows, Phœbe and Summer Warbler, seek the vicinity of human habitations during the nesting season, and, moreover, have greatly increased in numbers since the country became thickly settled.

The theory that is, perhaps, most naturally suggested, and the one that finds widest acceptance as explaining the facts, is that migration began in a search for food. That is, the food supply becoming short in the vicinity of the home (a bird's home is thus assumed to be the place where it rears its young, and may therefore be quite different from the locality where it spends the remainder of the time) they wandered away in search of food, returning again and again to the home vicinity. These journeys were extended farther and farther, the birds returning each nesting season, undoubtedly oftener at first, to or near the locality where they were born. This process went on until their wandering became a fixed habit, and finally in the countless generations of birds that have come and gone, this habit has been crystallized into what we now call, for want of a better term, the instinct of migration.

This idea has been amplified and extended by Alfred Russel Wallace (*Nature*, X. 459). He supposed that "survival of the fittest" has probably exerted a powerful influence in weeding out certain individuals. He supposed further that breeding can only be safely accomplished as a rule in a given area, and that during a greater part of the rest of the year sufficient food cannot be

obtained in that area. "It will follow that those birds which do not leave the breeding area at the proper season will suffer, and ultimately become extinct; which will also be the fate of those which do not leave the feeding area at the proper time." His further argument is ingenious, and, it must be added, extremely plausible. He says: "Now, if we suppose that the two areas were (for some remote ancestor of the existing species) coincident, but by geological and climatic changes gradually diverted from each other, we can easily understand how the habit of incipient and partial migration at the proper seasons would at last become hereditary, and so fixed as to be what we term an instinct."

It will probably be found, however, if anything like a satisfactory explanation can be arrived at, that this habit or instinct has arisen in more than one way, but we may appropriately turn from a consideration of theories to a review of certain observed facts of migration.

It is now abundantly established that migration is mostly carried on at night, and further mainly during clear nights. Only a comparatively few species, such as Ducks, Cranes, certain large Hawks, Swallows, Swifts, and Nighthawks, migrate during the daytime, and these, it will be observed, are either rapacious birds or mainly those that enjoy such power of rapid flight as to be relatively safe from capture. All the vast horde of Warblers, Sparrows, Finches, Flycatchers, Thrushes, and Woodpeckers, as well as many waders and swimmers, migrate at night. On clear, still nights during the migrations birds may often be heard calling to each other high overhead, and, as will be described later, may be actually seen by powerful telescopes. Woods and hedgerows that were untenanted one day may become fairly alive with birds at daylight the next morning, showing that they have arrived during the night. They remain to feed and rest during the day, and, if the weather be favorable, may practically all disappear the next night. That they only venture on these journeys during clear nights is shown by the fact that on such nights very few birds are killed by lighthouses, monuments, or other obstructions, whereas on cloudy or rainy nights, especially such as opened clear and later become overcast, thousands of birds become confused and dash themselves against these obstructions. Thus over 1500 birds have been found dead at the base of the Bartholdi Statue in New York harbor in a single morning, and 230 birds of one species — Black-poll Warblers — were killed in a single night (September 30, 1883) by the Fire Island light. The Washington monument, although not illuminated at night, causes the death of hundreds of birds annually.

The height above the earth at which migrating birds travel has been made the subject of some interesting observations, the first of which appear to have been by Mr. W. E. D. Scott, on the night of October 19, 1880, at Princeton, New Jersey. In company with a number of visitors he was being shown through the astronomical observatory at that place, and after looking at a number of objects through the 9½-inch equatorial, they were shown the moon, then a few days past its full phase. His attention was at once arrested by numbers of small birds that could be more or less plainly seen passing across the field of observation. Most of the kinds seen were the smaller land birds, among which were plainly recognized

Warblers, Finches, Woodpeckers, and Blackbirds. He was able to identify with much certainty the characteristic undulating flight of the Goldfinch, and the broad boat-shaped tail of the Purple Grackle. The flight of the birds noted was apparently nearly at right angles to the field of observation, and they were passing at the rate of 4½ per minute. As nearly as could be estimated their height above the earth was between one and two miles.

In the following year similar observations were made by Scott and Dr. J. A. Allen, but the results were not as striking, only 13 birds passing in any quarter of an hour. They were also apparently flying lower than on the first occasion.

Some years later observations on nocturnal flight were taken up by Mr. Chapman, who spent three hours on the night of September 3, 1887, at Tenafly, New Jersey. During this time 362 birds passed across the moon's face. Of these 233 were computed to be at a height of from 1500 to 15,100 feet, and curiously the lowest birds seemed to be flying upward, as though they "had arisen in the immediate neighborhood and were seeking the proper elevation at which to continue their flight, but after that time the line of flight was parallel to the earth's surface." He was able to identify positively only comparatively few species, such as the Carolina Rail, Grackle, and a large Snipe.

But perhaps the most satisfactory observations of all were those made also by Chapman, who, in company with a number of ornithologists, spent the night of September 26, 1891, at the Bartholdi Statue, New York. The weather proved to be exceptionably favorable, being clear during the early and later portions of the night, with an intermittent rain storm lasting for three hours between. As early as eight o'clock the birds began to be seen and heard, but almost simultaneously with the beginning of the rain there occurred a very marked increase in the number of birds seen about the light. They came singly, in troops and in thousands, were visible for a moment and passed on into the darkness beyond. "The birds chirped and called incessantly. Frequently, when few could be seen, hundreds were heard passing in the darkness; the air was filled with the lisping notes of Warblers, and the mellow whistle of Thrushes, and at no time during the night was there perfect silence."

Later recorded observations were made by Mr. O. G. Libby (*Auk*, XVI. 140), who studied the nocturnal migrations at Madison, Wisconsin, in September, 1897. His first place of observation was a small elevation in the vicinity of three small lakes, where he undertook to make a record of the number of bird calls heard. During the night a total of 3800 calls were recorded. The number of calls varied greatly, sometimes running as high as two or three per second and again falling to that number per minute. The largest number counted was 936.

From the nature of the data it was manifestly impossible to estimate the number of birds represented by these calls, but the effect was impressive in the extreme. He says: "Nothing but an actual experience of a similar nature can adequately convey the impression produced by such observations. The air seemed at times fairly alive with invisible birds as the calls rang out now faintly and far away, now sharply and near at hand. All varieties of bird calls came

sounding out of the darkness that evening. The harsh squawk of a water bird would be followed by the musical *chink* of the Bobolink. The fine, shrill notes of the smaller Sparrows and Warblers were heard only close at hand, but the louder ones came from all along the line, east and west. More than once an entire flock, distinct by the variety of their calls, came into range and passed out of hearing, keeping up their regular formation with the precision of a rapidly moving but orderly body of horsemen. The great space of air above swarmed with life. Singly or in groups, large and small, or more seldom in a great throng the hurrying myriads pressed southward."

The second station chosen by Mr. Libby was the Washburn Observatory, where for three nights he watched the birds passing across the face of the moon. During the three nights a total of 583 birds were counted, the largest number in any fifteen-minute period being 45. Considerable diversity in the direction of flight was noted. Thus up to ten o'clock the prevailing direction was south, but after this time the diversity increased, until it reached its maximum between twelve and two o'clock, when eight principal points of the compass were represented by numbers varying from 3 to 28. However, two thirds of the number were still maintaining a southerly direction.

Libby attempted to estimate roughly the total number of birds that passed his point of observation during the three nights, but as he well says, "when one recalls the relatively small size of the moon's surface as compared to its path from east to west, within the range of vision," the difficulty becomes evident. As nearly as could be made out, about 9000 birds were passing per hour, or a grand total of 168,000.

The rate of speed at which birds travel during the migrations, and also at other times, has been made the subject of observation, although the results, as might be expected from the confusing elements which must enter into such an inquiry, are far from complete or satisfactory. If the speed often attained by powerful and swift-flying species, such as Ducks, Geese, Swallows, etc., could be maintained, it is obvious that the time occupied in migrations would be inconsiderable. But, as will be shown later, the maximum speed appears to be rarely or never realized at this time.

Frank Forrester records 90 miles an hour for Ducks, as noted by telegraph from point to point, and an Albatross has been known to cover 3150 miles in 12 days. The actual distance flown by the latter bird was probably at least twice as great, for they rarely fly far in a straight line.

Some years ago Griffitt made some observations (recorded in *The Field*, Feb. 19, 1887) in a closed gallery on the speed attained by "blue-rock" Pigeons and English Pheasants and Partridges. The two first mentioned flew at the rate of only 32.8 miles per hour, while the Partridge made but 28.4 miles, and these rates were all considerably in excess of what they made in the open. The Carrier Pigeon is a rather fast flying bird, yet the average speed is not very great. Thus the average made in 18 matches (*The Field*, Jan. 22, 1887) was only 36 English miles an hour, although in two of these trials a speed of about 55 miles was maintained for 4 successive hours. In this country the average racing speed is

apparently about 35 miles an hour, although a few exceptionally rapid birds have made short distance flight at the rate of from 45 to 52 miles an hour. One of the longest recorded flights of a Carrier Pigeon was from Pensacola, Florida, to Fall River, Massachusetts, an air-line distance of 1183 miles, made in 15½ days, or only about 76 miles a day.

Herr Gätke, whose observations on Heligoland, a small island in the North Sea, extended over a period of fifty years, would give to birds a speed that is incredible. For example, the Gray Crows were believed by him to pass over the 360 miles between Heligoland and Lincolnshire at a rate of 120 miles an hour, and Curlews, Godwits, and Plovers are said by him to cross from Heligoland to the oyster beds lying to the eastward, a distance of a little more than 4 miles, in one minute, or at the astonishing rate of 240 miles an hour. The error in these observations, as suggested by Newton ("Dictionary of Birds," p. 566), probably lies in the impossibility of identifying the individuals that leave one of the given points with those first arriving at the other end of the line. Professor Newton also calls attention to the fact that few birds, even Swallows and Quail, fly as fast as an express train from whose windows they may be observed. It is a common experience, when a train is passing along at no great speed, for various birds to be flushed by it, but after flying vigorously for a few hundred yards they quickly drop behind.

But granting that the occasional speed is very considerable, the actual speed of most migrating birds appears to be surprisingly low. Observations tending to prove this were made some years ago under the direction of Professor W. W. Cooke, in the Mississippi Valley. The services of over one hundred observers were enlisted, at stations ranging from the Gulf to Manitoba. The date at which a certain species was first noted at the most southern point was compared with the first appearance of that species at the most northern point; the distance in miles between these two stations is then divided by the number of days between the observations. Thus the Baltimore Oriole was first seen at Rodney, Mississippi, April 7, and was not observed at Oak Point, Manitoba, until May 25. The distance in a straight line between these two places is 1298 miles, and as it took 48 days, the average speed was 27 miles a day. The records of fifty-eight species for the spring of 1883 gave an average speed of 23 miles a day for an average distance of 420 miles, while in the following year a slightly smaller number of species gave exactly the same average speed over an average distance of 861 miles. In the case of individual species the results were of much interest. Thus the Robin, Cowbird, and Yellowhammer traveled at an average speed of about 12 miles a day, while the average for the Summer Redbird, Ruby-throated Hummingbird, and Nighthawk was 28 miles a day. It is, however, necessary to take so many things into account in arriving at these conclusions that it is easy to see the possibilities of error. For example, meteorological conditions play an important part during migrations; a rain storm or an unusually cold spell may retard progress for days. Even if the conditions are favorable, it is hardly probable that the same individuals migrate for more than a night or two without intermission, so that while the species may be making progress the individuals

are alternating a night or two of travel with often several days of rest and recuperation. Again, it was found that most species traveled considerably faster during the latter part of the journey than during the first part. Thus six species showed an increase of 77 per cent in speed for the northern half of their journey, and the same general result was obtained by calculating the average speed of twenty-five species separately for each of the different months in which migration is performed; the average for March being 19 miles, for April 23 miles, and for May 26 miles a day. The species which are late migrants also move faster than those which start earlier and take more time about it.

The persistence with which birds cling to established lines of travel during the migrations is one of the most remarkable facts within the range of bird life, and this in not a few cases can only be interpreted in the light of past geological conditions. Thus certain species which breed in Europe and spend the winter in Africa now cross the Mediterranean at one of the widest points, a seemingly needless waste of energy. But soundings between these points have shown that the sea for much of the distance is relatively shallow, and that a moderate subsidence has changed what may have been narrowest to what is now one of the broadest points. This subsidence was undoubtedly slow and first resulted in the formation of a series of islands and lagoons, and the birds easily passed from one island to another, and even after the last bit of land had disappeared they still followed the old route established by their remote ancestors.

Many shore and water birds that spend the breeding season in and about the Arctic Circle to the north of Europe and Asia, follow lines of travel during their migrations that were undoubtedly established under past continental or oceanic conditions. Thus certain species take a circuitous route over what is now a wide expanse of open ocean, while others pass far inland through the Russian and central European lowlands. Those of the first class are simply still following an ancient shore-line, and those of the second class the location of an inland shallow sea. In other cases there is little evidence of former land connection, for many North American species, even of the smaller land birds, cross the Gulf of Mexico at its widest part.

The Old World Migratory Quail (*Coturnix coturnix*) is one of the comparatively few migrants among the so-called game birds. During the migrations they wander far from places of their birth, reaching South Africa, Persia, and India. The individuals inhabiting Great Britain, or at least a part of them, long ago established a migration route in a southeasterly direction. When examples from Great Britain were introduced into New England, they adapted themselves readily to their new surroundings and reared young, but when the season for migration arrived the inherited tendency to go in a southeasterly direction asserted itself, and, according to Mr. William Palmer, of the U. S. National Museum, they all passed out into the broad expanse of the Atlantic and were lost.

For several decades it has been noted that a few species of birds from western Asia have been gradually extending their summer range into northern Scandinavia. When these species migrate, instead of going south through central Scandinavia or southwest along the coast-line, as do the original Scandinavian residents,

they turn back east to the point in Siberia whence they came, before turning southward to spend the winter on the borders of India.

Forty or more species of migratory birds occur as summer residents in the Yukon Basin, Alaska. Of these some fourteen species are Pacific coast birds. With a single exception they are all thought to reach the upper Yukon by crossing the Alaskan coast range of mountains. This exception, according to Mr. W. H. Osgood, of the U. S. Biological Survey, is the Varied Thrush (*Hesperocichla nævia*), which apparently reaches its summer home by going up the coast to the lowlands below the mouth of the Yukon, and thence follows this river for almost 2000 miles. Equally abundant with it in this summer home is the common Snowbird (*Junco hyemalis*) of the eastern United States, which reaches the Yukon Basin by way of the Mississippi Valley.

Perhaps the longest straight-away flight made during the migrations is accomplished by certain shore and water birds, as the Tattler (*Heteractitis incanus*), Sanderling (*Calidris arenaria*), Turnstone (*Arenaria interpres*), and the Pintail and Shoveler Ducks, which nest on islands in the Bering Sea and spend the winter in the Fanning and Hawaiian groups, a distance of some 2200 miles. As the shore birds above enumerated are probably unable to rest on the surface of the water, the entire distance must be accomplished in a single flight. It is difficult indeed to see how this line of migration could have been established. Following the analogy of the Old World species before mentioned whose path marks an ancient shore-line, we might presume that there was at one time a land connection, or at least a chain of islands, between the Aleutian and Hawaiian groups, but on the contrary the depths of the Pacific are profound between these points, and there is not the slightest geological evidence on which to base a former land connection. When it is recalled how slight a deviation at the point of departure would suffice to throw them to the one side or the other of the Hawaiian Islands, the accomplishment is truly marvelous. In the absence of familiar landmarks and surrounded by a waste of sky and water, they make their way with the precision of a rifle bullet.

The Plovers, Sandpipers, and kindred species take migratory journeys often of extraordinary length. Thus the American Golden Plover (*Charadrius dominicus*) breeds in Arctic America, some venturing a thousand miles north of the Arctic Circle, and migrates through the entire length of North and South America to its winter home in Patagonia, and curiously the spring and fall routes are very different. After feasting on the crowberry in Labrador they seek the coast of Nova Scotia, where they strike straight out to sea, taking a direct course for the easternmost islands of the West Indies, and thence to the northeastern coast of South America. In spring not one returns by this route, but in March they appear in Guatemala and Texas. "April finds their long lines trailing across the prairies of the Mississippi Valley; the first of May sees them crossing our northern boundary, and by the first week in June they reappear in their breeding grounds in the frozen North." The little Sanderling just mentioned is almost cosmopolitan in distribution, breeding in Arctic and sub-Arctic regions and migrating in the New World to Chile and Patagonia, a distance of 8000 miles, and in the

Old World along all the shores of Europe, Asia, and Africa. The Bartramian Sandpiper (*Bartramia longicauda*) nests from eastern North America to Nova Scotia and Alaska, and goes south in winter to southern South America. The Solitary Sandpiper (*Totanus solitarius*) breeds mainly to the north of the United States and winters as far south as Brazil and Peru. The Buff-breasted Sandpiper (*Tryngites subruficollis*) rears its young in the Yukon district of Alaska and from the interior of British Columbia to the Arctic coast, and journeys in winter well into South America. The Turnstone (*Arenaria interpres*), a little shore-bird about the size of the Song Thrush of Europe, is also cosmopolitan, breeding in high northern latitudes and at other times of the year being found along the coast of Europe, Asia, Africa, North America, South America to the Straits of Magellan, Australia, and the Atlantic and Pacific islands. It is one of the species mentioned as making the wonderful flight from islands in the Bering Sea to the Hawaiian Islands.

The Ducks form another interesting group, although their journeys during the migrations are not nearly so extended as the birds just mentioned. The larger number breed mainly to the north of the United States and many within the Arctic Circle. Certain species, as the Eider Duck, only come south in winter to the coast of northern Maine, others, as the Old Squaw, may reach the Potomac and the Ohio, while most of them, as the Bald-pate, Blue-winged Teal, Pintail, Golden-eye, Bufflehead, etc., visit Mexico, Guatemala, northern South America, or the West Indies.

Certain of the familiar birds of lawn, hedgerow, and field, for whose coming we watch so anxiously, may claim a moment's attention. The Bobolink, so dear to the hearts of the residents of New England, makes his appearance in his summer home in May. By the last of July or the first part of August the young are reared, the old males have lost their bright dress, and with a musical *chink* as their only note, they start southward. In the region of the Chesapeake they begin to congregate in vast flocks, where they are known as Reed-birds, but in a few weeks they pass on to the rice fields of the South, to become the dreaded Rice-bird. But by October the last one has disappeared, and some by way of Cuba, others by way of Central America, where a few may linger, the main body presses onward beyond the Amazon into central and southeastern Brazil. On the return journey they reach the southern border of the United States in March and April.

The Catbird is found in summer throughout the eastern United States and British Provinces, and in winter in the Southern States, Cuba, and middle America to Panama. Our common Robin is very erratic in habits of migration. Occasionally a few may winter in dense swamps as far north as southern Canada and Maine, but the majority spend the winter in the Southern States. The Chimney Swift is found in summer in eastern North America and thence north to Labrador and the fur countries. The winter is spent to the south of the United States. Cliff and Barn Swallows, which are found over nearly all North America in summer, may penetrate to Brazil, Paraguay, and the West Indies in winter. The Scarlet Tanager passes the winter in Central America and northern South America, and the familiar Indigo-bird may go as far as Panama.

The great group of Warblers, of which some 70 species are found in the United States, has been mentioned before. They are all strongly migratory and mainly pass beyond our southern borders in winter, although a few individuals of a single species — the Yellow-rumped Warbler — have been known to winter on Cape Cod. Some of them visit the West Indies, but the larger number, after rearing their young in the dense coniferous forests of the Hudson Bay region or even in Alaska, spend the winter in Mexico, Central America, or northern South America.

The Sparrows as a group are also strictly migratory. Quite a number, such as the Tree Sparrow (*Spizella monticola*), Snowflake (*Plectrophenax nivalis*), and Longspur (*Calcarius lapponicus*), breed far to the north of the United States in Arctic districts, and come down in winter into the Northern States or irregularly farther south. Many species which breed mainly north of the United States only go into the Middle and Southern States during the winter, while a few may reach the West Indies, Mexico, Central America, or northern South America. The Nighthawk is another example, some individuals spending the summer in Alaska and the winter in Patagonia, points separated by over five thousand miles, over which they must travel in spring and fall.

But after having described these migration routes and the wonderful journeys over continents and vast oceans, the mystery of mysteries — How is it possible for the birds to find their way so unerringly? — still remains without a wholly satisfactory answer. As in the case of theories propounded to account for the origin of migration, so numerous suggestions have been made to explain this wonderful faculty. Thus Dr. Von Middendorff, a distinguished naturalist who studied exhaustively the migrations in the Russian Empire, suggests that because all the spring movements in that country are toward the magnetic pole, the migrating bird knows the location of this point and is enabled to direct its course accordingly. It is perhaps needless to say that this theory is not only unsupported by any serious data, but, as has been shown by Baird, is opposed to the facts of migration in North America.

If during the migrations the older and stronger birds always led the way, it might be said with plausibility that this faculty is due in large measure to experience, but here again the facts are either conflicting or directly opposed to such a view, for it seems to have been demonstrated with reasonable certainty that in Europe the young birds not only precede the old, during the fall movement, but often travel by a wholly different route. In this country, however, observations on this point are limited and authorities differ, but the tendency is to believe that the old birds do actually lead. Observation is much needed to settle this question.

In the case of birds migrating over land areas, sight is supposed by some to have an all-important function, especially when it is recalled that a bird two miles above the earth is surrounded by a horizon line of 90 miles on either side. As already shown, they have been observed at a height of three miles, which would easily keep them within sight of prominent landmarks, and would even permit them to cross considerable bodies of water without entirely losing themselves. That they depend to some extent on such landmarks to guide them on their

course seems to be shown by the fact that they migrate mainly on clear nights and are obliged to seek the earth on the approach of cloudiness and storms. But in the case of birds migrating over hundreds or even thousands of miles of open water, vision must play an unimportant part. Möbius (*Das Ausland*, August, 1882) suggests that in such cases they may be guided by observing the roll of the waves, but while this may be true in a few instances, it cannot possibly be so in the majority of cases. As an example of this power of orientation it may be mentioned that the members of the Harriman Alaska Expedition went by steamer from the island of Unalaska to Bogoslof Island, a distance of some 60 miles. "A dense fog had shut out every object beyond a hundred yards. When the steamer was halfway across, flocks of Murres, returning to Bogoslof after long quests for food, began to break through the fog-wall astern, fly parallel with the vessel, and disappear in the mists ahead. By chart and compass the ship was heading straight for the island; but its course was no more exact than that taken by the birds." — Cooke. We therefore seem inevitably led to the conclusion that birds are possessed of a "sense of direction." This "homing" faculty or power of orientation, which is, for example, so strongly developed in the Carrier Pigeon, is by no means unique among birds. It is possessed in a greater or less degree by many animals, by most savage races of men, and not infrequently by individuals among civilized races, more especially those accustomed to life away from centers of civilization, in forest and on plain, — just how it is to be explained is difficult to say. Some would give it the dignity of a sixth sense and would fix its seat in the semicircular canals of the ear.

CHAPTER V

THE CLASSIFICATION OF BIRDS

LASSIFICATION is the orderly grouping together of those beings or things that have certain characteristics in common. Zoölogical classification, therefore, is the grouping together of animals in accordance with their affinities and interrelationships so far as these have been ascertained, and consequently avian classification is an attempt to express, as nearly as present facts warrant, the lines along which it is supposed the birds have been developed. It may be regarded as the higher phase of ornithological study, requiring for its successful prosecution the widest knowledge, the keenest discrimination, and the most careful interpretation. The only satisfactory manner in which such a classification can be graphically displayed is by means of a so-called genealogical tree, the trunk and limbs of a tree, as it gradually divides into smaller and smaller branches, illustrating well the manner in which groups of birds are assumed to have developed, each from an earlier or ancestral stock. It is obviously impossible to show this relationship by arranging them in a linear sequence, although the exigencies of book making may render such disposition necessary. A linear arrangement may go well for a short distance, one group following another in an apparently natural succession, but sooner or later a point is reached where it is necessary to begin again at the base of another branch or stem, and so in the system of classification here adopted it is not necessarily to be presumed that each group is always related in equal degree to that which immediately precedes or follows it.

I have already pointed out that, although the Class of Birds is not sharply circumscribed by what may be called essential characters, the fact that they alone possess an outer covering of feathers makes their recognition easy under any and all circumstances. There can never be any doubt in the popular mind about the identification of a bird as such, a condition far from being true in many other coördinate groups of the animal kingdom. For present purposes, therefore, the Class of Birds may be said to be clearly differentiated, but when we come inside the Class a wholly different state of affairs is presented, for there is perhaps no group of similar scope in which the members are relatively so uniform in structure and appearance as are the birds. Their classification is thus naturally beset with many difficulties. As Mr. Ridgway well says: "Accepting evolution as an established fact, — and it is difficult to understand how any one who has studied the subject seriously can by any possibility believe otherwise, — there are no 'hard and fast lines,' no gaps, or 'missing links' in the chain of

existing animal forms except as they are caused by the extinction of intermediate types; therefore there can be no such group as family or genus (or any other for that matter) unless it is cut off from other groups by the existence of such a gap; because unless thus isolated it cannot be defined, and therefore has no existence in fact. These gaps being very unequally distributed, it necessarily follows that the groups thus formed are very unequal in value; sometimes alternate links in the chain may be missing; again, several in continuous sequence are gone, while occasionally a series of several or even numerous links may be intact. It thus happens that some family or generic groups seem very natural and homogeneous, because the range of generic or specific variation is not great and there is no near approach to the characters of another coördinate group, while others may seem very artificial or heterogeneous because among the many generic or specific forms none seems to have dropped out, and therefore, however great the range of variation in structural details, no division into trenchant groups is practicable, — not because extreme division would result, but simply because there can be no proper definition of groups which do not exist. In short, no group, whether of generic, family, or higher rank, can be valid unless it can be defined by characters which serve to distinguish it from every other."

Bearing these limitations in mind, it is not hard to understand the difficulties in the way of an acceptable classification of birds, but these obstacles should in no wise deter us from the attempt; nor have they, for the pathway of ornithological literature is strewn with them. Hardly any two students will be found in agreement in all particulars, and from the primary division of the Class to the faintest subspecies there may be almost every shade of opinion. As an example of these difficulties of treatment the primary division of the Class may be cited. To go no farther back than the promulgation of Huxley's celebrated "Classification of Birds," published in 1867, wherein he divided the Class Aves into three principal groups which he denominated Orders: Garrod in 1874 recognized but two primary divisions, which he called Suborders, as did Sclater in 1880, although neither included the Toothed-birds and their immediate allies. The forms admitted under the "Suborders" are also very different in the two latter systems. In 1884 Newton adopted the divisions of Huxley, but called them more appropriately Subclasses, while about the same time Reichenow proposed a scheme in which, exclusive of the Toothed-birds, he recognized no less than seven primary "Series." The next in order is Stejneger, who in 1884 divided the Class into four Subclasses. This number was reduced to two in the scheme of Gadow (1888), while Sharpe in 1891 returned to the three divisions of Huxley and Newton. Ridgway in 1901, in working out a plan of classification for his "Birds of North and Middle America," has found it expedient to adopt, tentatively, the two divisions of Gadow.

Examples of this difference of opinion might be multiplied almost indefinitely, but I will take the space for but one more. The Order Passeriformes, or so-called higher birds, embraces fully seven thousand species and subspecies, "or more than one half of all existing birds." Gadow in his plan for dividing them says it is possible to recognize no more than three families in all this vast

assemblage that will rank with the families of other groups, whereas Sharpe recognizes among them forty-nine families. "Surely," as Ridgway says, "between these extremes there is ample room for differences of opinion and variety of treatment!"

In attempting to select a scheme of classification to be followed in arranging the various parts of this work, I have been presented, so to speak, with the two horns of a dilemma. In the first place it is hardly to be presumed that many readers will have more than a passing interest in all the intricacies and finer problems of bird classification. The external appearance of birds, their habits of life and conduct in their multitudinous details, will be, I assume, the main points of attraction to most readers. To such any fairly consecutive arrangement might prove reasonably acceptable, especially when it is recalled that the state of the science is not now, nor will it apparently be for many a long year, in position to permit anything like a final classification of birds. But, on the other hand, it seems neither logical nor just to select an antiquated system when it is perhaps as easy to adopt one embodying the results of modern research along this line. Therefore the classification which I have finally adopted represents, so far as I have been able to make it, an attempt at defining the present status of knowledge regarding the affinities within the Class Aves. It is in the main the classification of Gadow, but has been modified in several minor particulars to accord with the later researches of Pycraft, Beddard, D'Arcy-Thompson, Shufeldt, Ridgway, Lucas, and other well known authorities. That this classification or any other will meet with the approval of all systematists is hardly to be expected. I make no special claim for originality; it is simply a putting together of facts from many sources in the hope that it may prove a fairly acceptable arrangement.

OUTLINE OF CLASSIFICATION OF BIRDS ADOPTED IN THIS WORK

Class **AVES**

Subclass I. **ARCHÆORNITHES** . . . . . Archæopteryx

Subclass II. **NEORNITHES**

Order I. **HESPERORNITHIFORMES** . . . . . Hesperornis
Order II. **ICHTHYORNITHIFORMES** . . . . . Ichthyornis
Order III. **STRUTHIONIFORMES** . . . . . Ostriches
Order IV. **RHEIFORMES** . . . . . Rheas
Order V. **CASUARIIFORMES** . . . . Cassowaries and Emeus
Order VI. **CRYPTURIFORMES** . . . . . Tinamous
Order VII. **DINORNITHIFORMES** . . . . . Moas
Order VIII. **ÆPYORNITHIFORMES** . . . . . Elephant-birds
Order IX. **APTERYGIFORMES** . . . . . Apteryx

Order X. **SPHENISCIFORMES** . . . . . Penguins
Family Spheniscidæ . . . . . Penguins

Order XI. **COLYMBIFORMES** . . . . . Loons and Grebes

Suborder COLYMBI
Family Gaviidæ . . . . . Loons

Suborder PODICIPEDES
Family Podicipedidæ . . . . . Grebes

Order XII. **PROCELLARIIFORMES** . . . . Albatrosses and Petrels

Family Diomedeidæ . . . . . Albatrosses
Family Procellariidæ . . . . . Petrels
Family Pelecanoididæ . . . . . Diving Petrels

Order XIII. **CICONIIFORMES** . . . . . Stork-like Birds

Suborder STEGANOPODES
Family Phaëthontidæ . . . . . Tropic-birds
Family Pelecanidæ . . . . . Pelicans
Family Phalacrocoracidæ . . . . . Cormorants
Family Anhingidæ . . . . . Snake-birds
Family Sulidæ . . . . . Gannets
Family Fregatidæ . . . . . Frigate-birds

Suborder ARDEÆ
Family Ardeidæ . . . . . Herons
Family Cochleariidæ . . . . . Spoon-bills
Family Balænicipitidæ . . . . . Shoe-bills
Family Scopidæ . . . . . Umbretta

Suborder CICONIÆ
Family Ciconiidæ . . . . . Storks
Family Ibididæ . . . . . Ibises
Family Plataleidæ . . . . . Spoon-bills

Suborder PHŒNICOPTERI
Superfamily Phœnicopteridæ . . . . . Flamingos

Order XIV. **ANSERIFORMES** . . . . . Goose-like Birds

Suborder PALAMEDEÆ
Family Palamedeidæ . . . . . Screamers

Suborder ANSERES
Family Anatidæ . . . . . Swans, Geese, and Ducks

Order XV. **FALCONIFORMES** . . . . . Falcon-like Birds

Suborder CATHARTÆ
Family Cathartidæ . . . . . American Vultures

Suborder GYPOGERANI
Family Gypogeranidæ . . . . . Secretary-birds

Suborder ACCIPITRES
Family Falconidæ . . . . . Falcons
Family Buteonidæ . Kites, Ospreys, Eagles, Vultures, Harriers, etc.

Order XVI. **GALLIFORMES** . . . . . Fowl-like Birds

Suborder MESŒNATIDES
Family Mesœnatidæ . . . . Madagascar Kagu or Mesite

Suborder TURNICES
Family Turnicidæ . . . . Bustard Quails, or Hemipodes
Family Pedionomidæ . . . . . Collared Hemipodes

Suborder GALLI
Family Megapodidæ . . . Megapodes, or Mound-builders
Family Cracidæ . . . . . Curassows
Family Phasianidæ . Turkeys, Partridges, Quails, Pheasants, etc.

Suborder OPISTHOCOMI
Family Opisthocomidæ . . . . . Hoactzin

Order XVII. **GRUIFORMES** . . . . . Crane-like Birds
Family Rallidæ . . . . . Rails
Family Gruidæ . . . . Cranes, Courlans, and Trumpeters
Family Cariamidæ . . . . . Cariamas
Family Otididæ . . . . . Bustards
Family Rhinochetidæ . . . . . Kagu
Family Eurypygidæ . . . . . Sun-Bitterns
Family Heliornithidæ . . . . . Sun-Grebes or Finfeet

Order XVIII. **CHARADRIIFORMES** . . . . Plover-like Birds

I. LARO–LIMICOLÆ

Suborder LIMICOLÆ
Family Charadriidæ . . . . Plovers, Snipes, and Curlews
Family Chionididæ . . . . . Sheath-bills
Family Dromadidæ . . . . . Crab Plovers
Family Glareolidæ . . . . . Pratincoles and Coursers
Family Thinocoridæ . . . . . Seed-Snipe
Family Œdicnemidæ . . . . . Thick-knees
Family Jacanidæ . . . . . Jacanas

Suborder LARI
Family Laridæ . . . . . Gulls, Terns, and Skimmers
Family Alcidæ . . . . . Auks

II. PTEROCLO–COLUMBÆ

Suborder PTEROCLES
Family Pteroclidæ . . . . . Sand Grouse

Suborder COLUMBÆ

Family Dididæ . . . . . Dodo and Solitaire
Family Columbidæ . . . . . Pigeons

Order XIX. **CUCULIFORMES** . . . . . Cuckoo-like Birds

Suborder CUCULI

Family Cuculidæ . . . . . Cuckoos
Family Musophagidæ . . . . . Plantain-eaters

Suborder PSITTACI

Family Trichoglossidæ . . Nestors, Lories, False Lorikeets, etc.
Family Psittacidæ . . . . . Cockatoos and Parrots

Order XX. **CORACIIFORMES** . . . . . Roller-like Birds

Suborder CORACIÆ

Family Coraciidæ . . . . . Kirumbos and Rollers
Family Momotidæ . . . . . Motmots and Todies
Family Alcedinidæ . . . . . Kingfishers
Family Meropidæ . . . . . Bee-eaters
Family Bucerotidæ . . . . . Hornbills
Family Upupidæ . . . . . Hoopoes

Suborder STRIGES

Family Strigidæ . . . . . Owls

Suborder CAPRIMULGI

Family Steatornithidæ . . . . . Oil-birds
Family Podargidæ . . . . . Frogmouths
Family Caprimulgidæ . . . . . Goatsuckers

Suborder MICROPODII

Family Trochilidæ . . . . . Hummingbirds
Family Micropodidæ . . . . . Swifts

Suborder COLII

Family Coliidæ . . . . . Colies

Suborder TROGONES

Family Trogonidæ . . . . . Trogons

Suborder PICI

Family Galbulidæ . . . . . Puff-birds and Jacamars
Family Capitonidæ . . . . . Barbets and Honey-guides
Family Rhamphastidæ . . . . . Toucans
Family Picidæ . . . . . Woodpeckers and Wrynecks

Order XXI. **PASSERIFORMES** . . . . . Sparrow-like Birds

Suborder DESMODACTYLI

Superfamily Eurylaimidæ . . . . . Broad-bills

Suborder ELEUTHERODACTYLI

Superfamily Clamatores

Family Pittidæ . . . . . Pittas
Family Philepittidæ . . . . . Asities
Family Xenicidæ . . . Rifleman and New Zealand Wrens
Family Oxyruncidæ . . . . . Sharp-bills
Family Tyrannidæ . . . . . Tyrant-birds
Family Pipridæ . . . . . Manakins
Family Cotingidæ . . . . . Chatterers
Family Phytotomidæ . . . . . Plant-cutters
Family Dendrocolaptidæ . . . . . Wood-Hewers
Family Furnariidæ . . . . . Oven-birds
Family Formicariidæ . . . . . Ant-birds
Family Conopophagidæ . . . . . Ant-pipits
Family Pteroptochidæ . . . . . Tapacolas

Superfamily Pseudoscines

Family Menuridæ . . . . . Lyre-birds
Family Atrichornithidæ . . . . . Scrub-birds

Superfamily Oscines . . . . . Singing-birds

Family Alaudidæ . . . . . Larks
Family Motacillidæ . . . . . Wagtails and Pipits
Family Enicuridæ . . . . . Fork-tails
Family Timeliidæ . . . . . Babbling Thrushes
Family Pycnonotidæ . . . . . Bulbuls
Family Muscicapidæ . . . . . Flycatchers
Family Turdidæ . . . . . Thrushes
Family Zeledoniidæ . . . . . Wren-Thrush
Family Mimidæ . . . . . Mockingbirds
Family Cinclidæ . . . . . Dippers
Family Troglodytidæ . . . . . Wrens
Family Chamæidæ . . . . . Wren-Tits
Family Sylviidæ . . . . . Old World Warblers
Family Regulidæ . . . . . Kinglets
Family Hirundinidæ . . . . . Swallows
Family Campephagidæ . . . . . Cuckoo-Shrikes
Family Dicruridæ . . . . . Drongos
Family Ampelidæ . . . . . Waxwings
Family Ptilogonatidæ . . . . . Silky Flycatchers
Family Dulidæ . . . . . Palm Chats
Family Artamidæ . . . . . Wood-Swallows
Family Vangidæ . . . . . Vanga-Shrikes
Family Laniidæ . . . . . Shrikes
Family Prionopidæ . . . . . Wood-Shrikes
Family Aërocharidæ . . . . . Helmet-birds

Family Vireonidæ . . . . . Vireos
Family Sittidæ . . . . . Nuthatches
Family Hypositticidæ . . . . . Coral-billed Nuthatch
Family Paridæ . . . . . Titmice
Family Oriolidæ . . . . . Orioles
Family Ptilonorhynchidæ . . . . . Bower-birds
Family Paradiseidæ . . . . . Birds-of-Paradise
Family Corvidæ . . . . . Crows and Jays
Family Sturnidæ . . . . . Starlings
Family Eulabetidæ . . . . . Glossy Starlings
Family Meliphagidæ . . . . . Honey-eaters
Family Zosteropidæ . . . . . White-eyes
Family Nectariniidæ . . . . . Sun-birds
Family Dicæidæ . . . . . Flower-peckers
Family Certhiidæ . . . . . Creepers
Family Cœrebidæ . . . . . Honey-creepers
Family Drepanididæ . . . . . Hawaiian Honey-creepers
Family Mniotiltidæ . . . . . Wood-Warblers
Family Tanagridæ . . . . . Tanagers
Family Ploceidæ . . . . . Weaver-birds
Family Icteridæ . . . . . Troupials
Family Procniatidæ . . . . . Swallow-Tanagers
Family Catamblyrhynchidæ . . . . . Plush-capped Finches
Family Fringillidæ . . . . . Finches

FIG. 19a. — Lizard-tailed Bird, *Archæopteryx*. (Restoration.)

CHAPTER VI

THE ARCHÆOPTERYX, OR LIZARD-TAILED BIRD

(Subclass *Archæornithes*)

GEOLOGICAL Occurrence. — The oldest bird of which we have any knowledge, called the *Archæopteryx*, or Lizard-tailed bird, the latter name from its slender lizard like but curiously feathered tail, is found fossil in the lithographic slates of Solenhofen, Bavaria, where its presence was first made known by the discovery in 1861 of the impression of a single feather. The existence of a bird in a geological horizon of such relatively great antiquity as this — Upper Jurassic — was at first somewhat doubted, but a year or two after the first discovery a second specimen, showing much of the skeleton, was obtained, and in 1877 another, these being all thus far secured. The ex mple found in 1863 is now preserved in the British Museum, London, while the last, and as it proves, best example, is in the Berlin Museum. These two specimens, which are sometimes regarded as representing two distinct species (*Archæopteryx lithographica* and *A. siemensi*), supplement each other, and from them a fairly complete account may be gleaned of this remarkable bird. They have been very minutely studied by many eminent anatomists, as becomes their importance in affording almost our only actual knowledge of the transition between reptiles and birds.

Anatomy, Size, etc. — The Lizard-tailed bird was apparently about the size of our common Crow, being nearly eighteen inches in length. It had apparently a long, narrow body, while the head was small, pyramidal, nearly flat on top, and provided with large openings for the eyes. The upper jaw, and probably the lower as well, was provided with numerous teeth, which appear to have been set in a groove. There was no beak, for the teeth extended to the very tip of the jaw. The backbone consisted of some fifty biconcave vertebræ, of which number ten or eleven are regarded as belonging to the neck, a less number than is known in any modern bird, the lowest number being thirteen.

In place of the short, usually solid bones of the tail found in present birds, *Archæopteryx* had a long, slender tail of about twenty free bones exactly as in many reptiles. Certain of these bones, perhaps each of them, supported a pair of long tail feathers. These feathers at present lie at an angle of about thirty degrees to the bones of the tail, and as they are pretty closely matted together, it is difficult to determine the exact number, some students placing them at twenty pairs, and others, as Gadow, as low as twelve pairs; the truth perhaps lies some-

where between these extremes. Present knowledge does not permit a positive assertion that the tail could be raised or depressed at will, or the pairs of feathers spread or closed, though both conditions might readily have been possible, for a very small tendon would have been ample provision for the manipulation of these parts without any trace of its presence appearing on the bones.

Archæopteryx had four toes, and the whole leg and foot appeared very much like those of an ordinary perching bird, except that the tibia and fibula were distinct, as in most reptiles. The anterior limbs, however, are very curiously modified. The wings were rather short and rounded very much as in the common fowl, but unlike all known birds there were three long, slender fingers on each wing, each of which was armed with a hooked, sharp-edged claw. There were also relatively large flight feathers, the apparent number being seventeen in each wing, six or seven of which were primaries and the rest secondaries, and, it may be added, no other bird has so few primaries. In addition to the quills there was at least one row of wing-coverts.

The sternum, or breast-bone, is obscurely preserved and is more or less in doubt, some observers claiming that it is not only present but possesses a well-defined keel, while others declare that, although much has been written about it, nothing is absolutely known. A definite knowledge of this bone would be of great assistance in interpreting the probable habits of its owner. The three bones of the pelvis, as in most reptiles, are perfectly distinct from one another, and a further decidedly reptilian character is found in the absence of the hook-like processes of the ribs.

The covering of the body, aside from the wing and tail feathers, has been the subject of much speculation. From the fact that the feathers of tail and wings are preserved with such remarkable fidelity, it is argued that, had there been a general feather covering, some definite trace of it would remain. As it is, the only positive contour feathering seems to be confined to the leg, producing apparently a "booted" condition similar to that observed in the Falcons. There is also some slight evidence of the presence of a "ruff" about the base of the neck, as in the Condor, while the remainder of the body was apparently naked, or possibly covered with down or small feathers which disappeared during the decay which preceded the entombment. The contention advanced by certain writers that the body, aside from the feathering mentioned above, was covered with scales is not only absolutely unsupported by fact, but is in the highest degree improbable. The length of time that must have intervened in evolving the very perfect wing and tail feathers of *Archæopteryx* from reptilian scales, if that is whence they came, would undoubtedly have been ample for the production of some sort of a feather covering for the remainder of the body.

Probable Habits. — With the above facts before us we are perhaps in position to indulge in some fairly reasonable speculation as to the habits of this ancient bird. From the presence of a distinctly perching foot it may be inferred that a considerable portion of its life was spent in trees, which are known to have been abundantly present at that time, and further, that the curious hooked fingers were of assistance in climbing about among the branches, as are those of

a young Hoactzin of to-day. On account of the relative slenderness of both legs and feet, and to their position far back on the body, Mr. Beddard, a distinguished English anatomist, doubts if the *Archæopteryx* could have stood erect. On the ground he thinks it must have assumed a quadrupedal position. In support of the opposite view it may be stated that the tips of the wing quills are not worn or injured, as they almost certainly would have been had they habitually come in contact with the ground. But this is a point that obviously cannot be definitely settled.

The fact that no openings have been observed for the admission of air into the bones has been taken by several writers to militate against flight. This is certainly a very unsafe generalization, for, as already pointed out, certain birds, as for example the Swallows, that are past masters in the art of flying, have practically non-pneumatic bones, while others, as the Ostriches, have the bones highly pneumatic, yet cannot fly at all. Although the wings were rather short and rounded, the well-developed wing feathers, which appear adequate for the support of a bird of this size, seem to indicate beyond reasonable doubt that *Archæopteryx* could fly, though perhaps it was incapable of long sustained flight. The Tinamous furnish an example in point. They have short, rounded wings and can fly well for short distances, but soon become exhausted. If we possessed a more satisfactory knowledge of the breast bone, we should be the better able to decide regarding the probable power of flight, for if this was actually absent or very much reduced in size, it would appear to militate against the enjoyment of any great power of aërial locomotion. It may be added, as was pointed out by Professor Lydekker, that the slight development of the delto-pectoral crest of the humerus apparently indicates at least weak power of flight.

As to the food of the *Archæopteryx* we of course know nothing, but from the presence of the numerous distinct and rather sharp teeth it may be inferred that these were still of assistance in procuring food, which likely consisted of animals of some kind. But this is largely speculation.

All things considered, *Archæopteryx* was a most remarkable animal. While it possessed numerous points of structure unmistakably similar to those of reptiles, it was, on the whole, much nearer to the birds than to the reptiles. It is clearly a connecting link between the two classes, and yet we are undoubtedly still very far from the original point where the branch was made from the reptilian stem. Indeed, the reptiles as we know them may be very unlike what they were when the division occurred which ended in *Archæopteryx* on the one hand and modern reptiles on the other. In any event it must have taken a very long period of time for the development of such distinctly bird-like feet and featners. *Archæopteryx* is well entitled to be placed in a Subclass, opposed to all other known birds.

In 1881 Professor O. C. Marsh described, under the name of *Laopteryx priscus*, a crushed and broken skull and a single detached tooth that may or may not have belonged to it, from the Jurassic beds of Wyoming. This has been supposed to be the skull of a bird, and, for no other reason than that it is found in beds of similar geological age, has sometimes been placed in the Subclass with *Archæopteryx*. It now seems more than likely that it will be proved to belong to the reptiles, and in any case too little is known of its structure to definitely associate it with *Archæopteryx*.

CHAPTER VII

THE AMERICAN TOOTHED-BIRDS

(Subclass *Neornithes*)

(Orders *Hesperornithiformes* and *Ichthyornithiformes*)

IN point of time the next birds of which we have any knowledge, in the line of evolution between the Lizard-tailed birds and those of the present, are the so-called American Toothed-birds, the remains of which came to light some thirty or more years ago in the Cretaceous rocks of western Kansas. If it is true, as has been stated, that the bird-like elements in *Archæopteryx* amount to three fourths, and the reptilian features to no more than one fourth, of its make-up, then the Toothed-birds, although presenting a number of anomalous characters, are perhaps entitled to be called nine tenths "bird," for they exhibit a very distinct advance over the Lizard-tailed birds, which brings them in some respects quite close to if not indeed fully abreast of modern birds, and this be it remembered at a time so remote as the Cretaceous period. As the name implies, their most marked characteristic is the possession of distinct teeth, a character which they share in common with the *Archæopteryx*, but which sharply distinguishes them from all other known birds, either fossil or living. The manner in which the teeth are implanted in the jaw, as well as modifications of the skeleton which have resulted from very different modes of life, serve as a basis for dividing the Toothed-birds into very distinct groups which are thought to be of sufficient importance to rank as separate orders.

Hesperornis. — The first of these orders to be considered is typified by what has been named the *Hesperornis*, signifying literally "western bird," since at the time of its discovery the locality where it was found was beyond the western limits of extensive settlement. *Hesperornis* was a flightless, swimming and diving bird of great size, its length being nearly four feet. The skull was relatively small, while the bill or jaw was very long and slender, with its rami or branches united in front by a ligament only, and the component bones free from one another, as in reptiles. The teeth, which were replaced by a new one growing inside of and ultimately absorbing and pushing off the old one, are set in a continuous groove, and fill the lower mandible quite to the tip, while in the upper mandible they are confined to the basal portion or maxilla. The long and slender neck is made up of some seventeen saddle-shaped vertebræ, and was doubtless capable of rapid flexure and was thus of assistance in securing its prey. The wing was very much reduced, being represented by the humerus only, and was probably concealed beneath the skin or in any event among the

feathers. Without going into a complete description of the shoulder girdle it may be said that its elements, as interpreted in the light of recent material, make it very similar to the arrangement found in recent birds and not nearly so similar to the reptiles as was formerly supposed, and further, the struthious characters are also decidedly less apparent than was believed. The body or pelvis was greatly compressed, while the legs and feet present some anomalous features. The femur was short and stout, the tibia very long and slender

FIG. 20. — *Hesperornis regalis*. Skeleton in U. S. National Museum from which the restoration (Fig. 21) was made. Sternum and two anterior cervicals supplied by restoration. (Lucas.)

although somewhat pneumatic, the fibula slender, about three fourths the length of the tibia, and united to it by a cartilage only, while the metatarsus was relatively short and stout. The feet were four-toed, the outer toe being much the largest, and nearly twice the length of the third toe. Mr. F. A. Lucas was the first to call attention to the fact that the legs of *Hesperornis* were directed outward almost at right angles to the body, instead of downwards as in other birds, and that apparently they were naturally moved together like a pair of oars. There is also evidence to show that the toes were webbed as in the Grebes. This peculiar arrangement of the legs, combined with the almost total absence of wings, must have made this bird practically helpless on land, to which it doubtless resorted as rarely as possible, and then only for nesting purposes.

Some years ago Professor Williston discovered a fragmentary specimen which he thinks represents the plumage of *Hesperornis*, and if this is correct, it was covered with long, fluffy, hair-like feathers, which has been taken as another indication of its relationship with the Ostrich-like birds. This sort of plumage is seemingly but a poor adaptation for aquatic life, yet it is not wholly without parallel among recent birds, such for example as the Snake-birds (*Anhinga*), which are covered with a very loose and easily water-soaked feathering.

The life habits as interpreted by the structure, indicate that *Hesperornis* was carnivorous, feeding doubtless upon the fishes and other aquatic life that

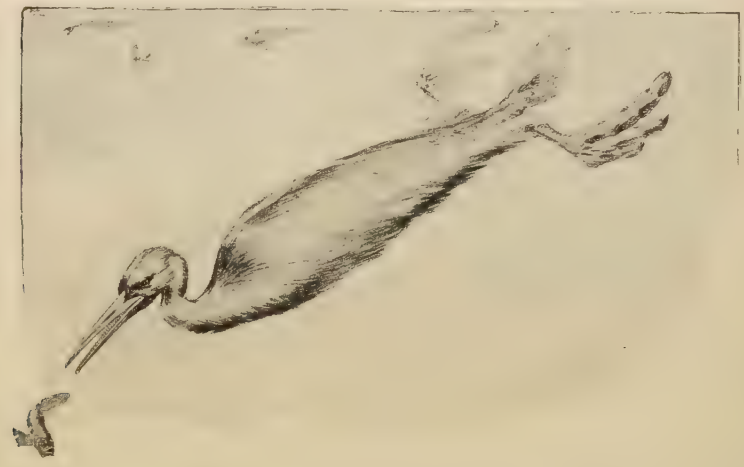


Fig. 21. — Restoration of the great toothed diver of the Cretaceous, *Hesperornis*, by Gleeson. (From Lucas's "Animals of the Past," by permission of the publishers, McClure, Phillips & Co.)

is known to have been abundantly present in the Cretaceous seas. Its narrow body and powerful legs and webbed toes point to its having been an expert swimmer and diver, enabling it to overtake its finny prey, in which it was assisted also by its long flexuous neck and numerous sharp, backward-pointing teeth.

As might be supposed the relationship of this remarkable bird has been the subject of much discussion and not a little difference of opinion, and so long as certain important parts of the skeleton remain unknown, its exact position must remain open to more or less question. It was at first regarded as a carnivorous, swimming Ostrich, but as already suggested, the structure does not at all bear out the claim of its struthious affinity, and moreover, as there is no authentic trace of the presence of the Ostrich in North America, this may be dismissed at once (cf. p. 63). By many it is regarded as being closely allied to, if not indeed the direct ancestor of, the Loons and Grebes, but as Mr. Lucas has very clearly shown, those portions of the skeleton which are thought to indicate kinship with the Loons and Grebes are only similarities of structure which have resulted from

similarity of habits. And, as he has further pointed out, the anomalous condition would be presented of placing the strong flying Loons and Grebes in the direct line of descent from a flightless bird, which would be "quite out of the question." All things considered it would appear that *Hesperornis* was in many respects a very highly specialized type which has been blotted out without leaving any close relatives among living birds.

Other Forms. — In the same beds with *Hesperornis regalis*, the form above mentioned, two additional species of *Hesperornis* were described, one of which has recently been removed as the type of a new genus (*Hargeria*), and another wholly different flightless swimming bird known as *Baptornis*, or the "plunging bird," in allusion to its probable diving habits. These are all imperfectly known, and a full description may be omitted.

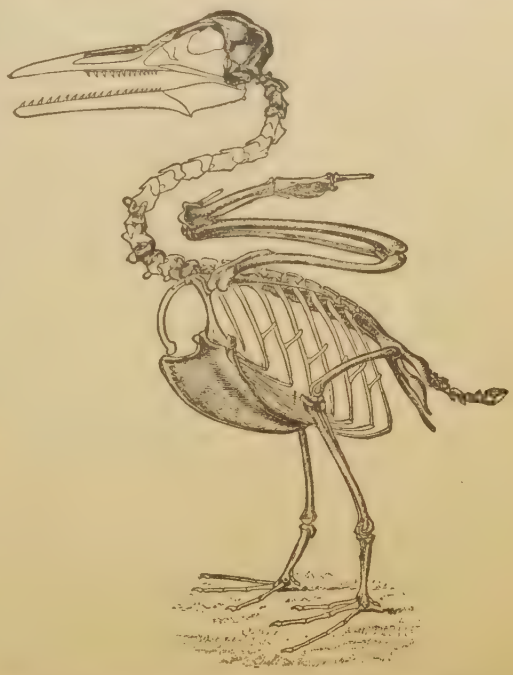


FIG. 22. — *Ichthyornis victor*, a Cretaceous Toothed-bird of flight, $\frac{1}{8}$ natural size. (Restored by Marsh.)

Ichthyornis. — The second order of Toothed-birds (the *Ichthyornithiformes*) differs essentially from the first, as already mentioned, in having the numerous teeth implanted in distinct sockets. They take their name from *Ichthyornis*, the principal genus, which signifies "fish bird," from the fact that the vertebræ are of the same shape as in fishes. Although a dozen or more nominal species have been described, disposed among five more or less tentative genera, the group is still imperfectly understood. Of the various members *Ichthyornis victor* is best known and may be selected for brief description. It was a much smaller bird than *Hesperornis*, being about the size of a common Pigeon, and was clearly a very powerful flyer. The head was relatively much larger than in *Hesperornis*, but the disposition of the teeth was the same in both, and the component parts of the mandibles were likewise distinct. The teeth were all sharp and pointed, more or less compressed, and strongly recurved, and were placed vertically as in the crocodiles and certain extinct lizards. The exact number of vertebræ

in the neck is not known, but from the large number found it is presumed that they were numerous, and that the neck was relatively long and slender. The undoubted strong power of flight enjoyed by *Ichthyornis* is well indicated by the shoulder girdle and wings, these conforming strictly to the type seen in strongly keeled living birds, and as has been said, "might have been used by some existing birds with strong powers of flight." The legs and feet are of small size and present no particular features that may not be observed in modern flying birds. The following account of the probable mode of life and habits of *Ichthyornis* is from Marsh, the original describer of the bird: "The sharp cutting teeth of *Ichthyornis* prove, beyond a doubt, that it was carnivorous; its great power of flight, long jaws, and its recurved teeth suggest, moreover, that it captured its prey alive. Its food was probably fishes, as their remains are found in great abundance mingled with those of *Ichthyornis*. These fossils occur in the bed of the old Cretaceous ocean in which *Hesperornis* swam. Both of these birds were clearly aquatic in habit, as shown by various points in their structure, and the conditions under which their remains were deposited. In many respects, *Ichthyornis* probably resembled the modern Terns in its mode of life. The powerful feet and wings suggest similar habits in flight and rest."

The affinities of *Ichthyornis* are almost as much in question as those of *Hesperornis*. By some it is regarded as being nearest to the Terns and especially the Skimmers, by others it is relegated to the vicinity of the Storks and Plovers, while still others would place it between the Ducks and *Accipitres*. The truth of the matter is its structure is still too imperfectly known to venture a positive opinion, and even if we were familiar with all the details of its anatomy, it is probable that its direct relationship with modern birds would still be as difficult to establish, for it appears to have belonged, together with its allies, the other Toothed-birds, to a group that represents one link in the chain of succession between reptiles and present birds.

CHAPTER VIII

THE OSTRICHES

(Order *Struthioniformes*)

IT is perhaps needless to say that the Ostriches are the largest of existing birds, a fully matured individual standing some eight feet in height and weighing quite three hundred pounds. But aside from preponderating size and weight they are readily separable from all other birds by the possession of a number of marked characters, the most important of which is the fact that they alone have but two toes — the third and fourth. They have a short, broad, and somewhat flattened bill opening to under the eyes, with the tip strong, rounded, and overtopping the lower mandible, while the oval nostrils are placed in a membranous groove near the middle. The whole head is relatively very small and the neck relatively very long, while the wings are short, imperfectly developed, and provided with long, soft plumes, and the tail is also short and composed of curved, drooping plumes; all feathers are without an aftershaft. The legs are very strong and covered in front near the toes with transverse scales. The toes are short but very thick and strong, and provided with short, stunted nails, though that of the outer toe is commonly absent. Another character of importance is that in the adult the head, neck, and legs are destitute of feathers.

Species. — The question as to whether the Ostriches shall be regarded as constituting a single species, or some three or four, is apparently still somewhat an open one, some ornithologists recognizing but one, which, however, is divided into several geographic races, while others would consider the differences sufficient to rank them as separate species. Be this as it may, the differences are but slight and the habits of the birds practically the same. Thus *the* Ostrich (*Struthio camelus*), found in the Soudan, Arabia, and southern Palestine, has the naked skin of the neck, head, and legs bright flesh-colored, and the eggs produced by this bird are smooth. In the birds inhabiting Somaliland (*S. molybdophanes*), the skin of the naked portions is bluish gray in color, while the Ostrich of South Africa (*S. australis*) has this skin lead-gray or even white-gray. In both of these last-mentioned forms the egg-shells are provided with large, deep pits of a dark purplish color. More recently the form inhabiting Masailand (*S. massaicus*) has been separated.

As might be presumed from their large size and imposing presence, the Ostrich, or Camel-bird, as it was often called, has attracted attention and interest from very ancient times, a fact attested not only by monuments and inscriptions, but by the abundant mention in the works of Aristotle, Pliny, Xenophon, and

others, as well as in the Bible. It would perhaps be of interest, did space permit, to quote from some of these ancient sources, but we may only mention that

Fig. 23. — North African Ostrich, *Struthio camelus*.

Pliny, following Aristotle, fell into the error of supposing that the Ostrich was part bird and part quadruped. He says: "This bird exceeds in height a man sitting on horseback, and can surpass him in swiftness, as wings have been given

it to aid it in running; in other respects Ostriches cannot be considered as birds, and do not raise themselves from the ground. They have cloven talons, very similar to the hoof of the stag; with these they fight, and they also employ them for seizing stones for the purpose of throwing at those who pursue them."

Distribution. — At the present time the Ostrich appears to be confined to certain of the desert portions of Africa as well as similar areas in Arabia and southern Palestine, but there is abundant evidence to show that within historic times it enjoyed a far more extensive range which included portions of Syria, Mesopotamia, eastern Persia, and perhaps Baluchistan, and in recent geologic time (Pliocene) it enjoyed a still wider distribution, since fossil remains of Ostriches, or at least of certain large two toed birds very near of kin to them, or their eggs, have been found in the Sivalik Hills in India, the Province of Cherson in southeastern Russia, northern China, the island of Samos, etc. The presence of a large Ostrich like bird in western North America has also been reported by Cope, but this determination rests on a single fragmentary bone, and is thought by later paleontologists to be open to grave question. There can be no doubt, however, that the range of the Ostrich has been undergoing a contraction for a very long period of time, and unfortunately this process seems to be going on at the present day, for countries where it was once reasonably abundant now know it no more or but rarely. The main stronghold is of course the Dark Continent, and there it will undoubtedly linger for a long time, but as this vast area comes gradually under the dominion of at least semi civilization, the Ostrich must of necessity give way. However, there is probably no danger of its disappearing utterly, at least so long as the votaries of fashion call for its plumes, for, as will be recounted later, it is now extensively "farmed."

Habits. — It is of course well known that the Ostrich is mainly an inhabitant of the desert, preferring the dry, sandy wastes, but not altogether shunning the valleys and plains that are studded with scattered low bushes, its commanding stature and long neck permitting it uninterrupted vision in all directions. It is an extremely wary bird, distrustful of all suspicious objects and especially of the presence of man, though it may often be seen in close proximity to herds of zebras, quaggas, giraffes, antelopes, and other quadrupeds. It is a very nervous, restless bird, continually on the move, especially during the daytime, and fleeing at the slightest approach of danger, its proverbial foolishness in hiding its head in the sand and thereby supposing that it was effectually concealed being now relegated to the limbo of myths along with dozens of others that have been illumined by the cold facts of science and truth. The Ostrich is gregarious, going about in small parties of from three or four up to a dozen or twenty, and exceptionally as many as fifty have been noted in company. During the breeding season the male is polygamous, consorting with some three, four, or five females which are acquired by blandishment or by fierce battles with rivals. The nest is very simple, being merely a slight hollow scratched in the sand, and all the females of a party lay in the same nest. There appears to be some uncertainty as to the usual number of eggs laid, but as many as thirty have not infrequently been recorded, and ordinarily there are a number scattered

about the vicinity of the nest which are not incubated, but are said to be used as food for the young chicks. The male performs almost the entire duty of incubation, being occasionally relieved by the females for short periods during the day, and occasionally when the sun is very hot the eggs are simply covered with warm sand, though this latter is perhaps as much for the purpose of keeping marauders away as for its warmth. The eggs hatch in some six or seven weeks, the chicks running about freely at birth and accompanying their parents, who are very solicitous for their safety, the male often trying to draw away pursuers by counterfeiting lameness or wounds. Thus Mr. Andersson describes graphically a family party that he once saw near Lake Ngami, which consisted of a male, female, and about twenty chicks the size of common barn-yard fowls. Finding it impossible to escape, the male "at once slackened his pace and diverged somewhat from his course; he again increased his speed, and with wings drooping so as to almost touch the ground, he hovered round us, now in wide circles and then decreasing the circumference till he came almost within pistol-shot, when he abruptly threw himself on the ground and struggled desperately to regain his legs, like a bird that had been badly wounded; having previously fired at him, I really thought he was disabled, and made quickly towards him; but this was only a ruse on his part, for on my nearer approach he slowly rose and began to run in an opposite direction from that of the female, who, by this time was considerably ahead with her charge." The young Ostriches are said to be remarkably silent, but the old birds and especially the males have a hoarse, mournful cry, which is likened by some to the roar of the lion, and by others to the lowing of an ox.

The omnivorous diet of the Ostrich is proverbial, though in a state of nature they are perhaps not more diversified in their choice of food than many other birds. They feed on herbage, seeds, fruits, berries, etc., varied with occasional insects, small mammals, birds, lizards, and snakes, but in captivity they will eat almost anything that can be swallowed, not infrequently taking substances that may cause their death. While they are capable of existing for long periods without water, they drink regularly whenever opportunity offers, and by some observers they are said to be fond of bathing, especially in very hot weather, when they may wade into a lake or even into the sea until only the head protrudes. They are very fond of salt, a certain amount of which seems to be essential to them.

The fleetness of the Ostrich is also proverbial, it being perhaps the most rapid terrestrial animal in the world. A single stride is said to approximate twenty-five feet or more, and it often attains when it first sets out a speed of sixty miles an hour, and can thus easily outrun the swiftest of its four-footed companions; indeed nothing would be able to overtake it were it not for its silly habit of running in a circle. The latter peculiarity is often taken advantage of to effect their capture, the hunter on a swift horse simply riding the arc of the circle and thus approaching them. Other methods of capture consist of following them with fresh relays of horses or camels until they fall exhausted, in drawing a continually narrowing cordon about them, or in urging them into skilfully concealed

pitfalls, while the Bushmen, "concealed in the sand or disguised in skins, shoot them with poisoned arrows."

Ostrich Farming. — As a matter of fact, probably few if any wild Ostriches are now killed for their feathers since it has been discovered that they can be domesticated and a superior quality of plumes produced. The first attempts at domesticating the Ostrich were made in South Africa about 1864, but these were not entirely successful until several years later, or about 1867. Within less than twenty years the industry had grown to such proportions that $40,000,000 of capital was employed, and the annual income exceeded $5,000,000. In 1891 a rather careful census showed the presence in South Africa of 154,880 tame birds, which number had risen in 1904 to 357,070. In the early days large fortunes were made in the industry when feathers were worth $500 per pound and the plumes of a single bird sometimes brought $100, though the present average annual income in Africa is only about $18 per bird. Ostrich farming was first inaugurated in the United States in 1882, when twenty-two birds were successfully imported from Cape Town to New York and shipped overland to California. During the next four years other parties ventured in the field of Ostrich farming, and from an importation of forty-four birds, made about 1890, fully eighty per cent of the approximately three thousand Ostriches in America have descended, the last importation — that of twelve Nubians — having been made in 1901. The industry is now successfully prosecuted in California, Arizona, Arkansas, North Carolina, and Florida, with the prospect of its enormous extension in the near future. The following account of the industry is taken from Dutcher: "A breeding pair of Ostriches will produce from ten to twenty chicks a year, which are worth, when six months old, $100 each; at one year, $150; at two years, $200; at three years, $300 to $350. They commence to breed when four years old, when, if prolific, they are valued at from $700 to $1000 per pair. Exceptionally fine birds sometimes bring as much as $1000 each. Good birds will produce from $35 to $50 worth of feathers each year, and exceptional ones from $75 to $90 annually. Plucking is done by putting the Ostrich in a V-shaped corral just large enough to admit its body, with room for the workmen. A hood, shaped like a stocking, is placed over the head of the Ostrich, when it becomes perfectly docile. The workman then raises the wings and clips the feathers that are fully ripe. Great care is exercised at this time, as a premature cutting of the feathers deteriorates the succeeding feather growth. There is no possibility of inflicting pain in plucking an Ostrich; not a drop of blood is drawn, nor a nerve touched. The large feathers are cut off, and in two months' time, when the quill is dried up, it is pulled out. By taking the feathers in this way it causes the bird absolutely no pain at all. An Ostrich is first plucked when it is nine months old, the third plucking being the full crop, which will weigh about one pound. Ostriches mate at four years of age and remain paired for life. The nest, which is simply a hole in the ground scooped out by the breast-bone of the bird, is about one foot deep by three and four feet in diameter. Eggs are laid every other day until about twelve or fourteen are deposited, each of which weighs from three to four pounds. The eggs are

turned daily in the nest by the birds, and are incubated forty-two days, the male taking the nest at five in the afternoon, where he remains on duty until nine the following morning, when the female goes on duty. The chicks, when hatched, are about the size of a domestic hen and present a mottled appearance. They grow about one foot in height every month, until they attain full growth, about seven to eight feet, when they will weigh from three to four hundred pounds. When fourteen months old the plumage generally changes, the female taking on a dull gray and the male a glossy black, both growing long white wing-feathers."

CHAPTER IX

THE RHEAS

(Order *Rheiformes*)

IN the New World the place of the Ostriches is taken by a somewhat closely related group of birds known as the Rheas, Nandus, or American Ostriches (*Rhea*). They are confined exclusively to the pampas of South America and are readily distinguished from the true Ostriches by the presence of three toes, a feathered neck, and practically no tail, though they agree with the Ostriches in the absence of aftershafts to the feathers. While there are numerous other differences in the skeleton and soft parts, it may be stated that the Rheas have the powerful legs and hence the similar tremendous speed of the Ostriches. Their habits, as will be recounted later, are also similar.

The Rheas are divided into three quite well-marked species, the largest being the Common Rhea (*Rhea americana*) found in Bolivia, Paraguay, Uruguay, and the Argentine Republic. It is much inferior in size to the true Ostrich, although about fifty-two inches in total length. The general color above is slaty gray, with the head blackish and the neck whitish, becoming dark between the shoulders. The under parts are whitish with the exception of two black crescents on the upper breast. This Rhea was once abundant throughout the Argentine Republic, but with the advent of firearms it has disappeared from many localities. The following account is from the pen of Mr. W. H. Hudson, who had opportunity for many years of studying its habits: "The Rhea is particularly well adapted in its size, color, faculties, and habits, to the condition of the level woodless country it inhabits; its lofty stature, which greatly exceeded that of many of its enemies, before the appearance of the European mounted hunter, enables it to see far; its dim gray plumage, the color of the haze, made it almost invisible to the eye at a distance, the long neck being so slender and the bulky body so nearly on a level with the tall grasses; while its speed exceeded that of all other animals inhabiting the same country.

"The Rhea lives in bands of from 3 or 4 to 20 or 30 individuals. When they are not persecuted they show no fear of man, and come about the houses, and are as familiar and tame as domestic animals; sometimes, indeed, they become too familiar. When persecuted Rheas soon acquire a wary habit, and escape by running almost before the enemy has caught sight of them, or else crouch down to conceal themselves in the long grass. Their speed and endurance are so great that, with a fair start, it is almost impossible for the hunter to overtake them,

however well mounted. When running the wings hang down like those of a wounded bird, or one wing is raised and held up like a great sail, for what reason it is impossible to say."

Fig. 24. — Common Rhea, *Rhea americana*.

The nesting season in the Argentine Republic begins in July, and several females lay in the same nest, which is simply a depression in the ground, each hen laying a dozen or more eggs. Hudson says: "It is common to find from 30 to 60 eggs in a nest, but sometimes a larger number, and I have heard of a nest

being found containing 120 eggs." The incubation is conducted entirely by the male, who watches over the young with great solicitude. The eggs when fresh are a fine golden yellow, but they grow paler day by day, until finally they fade to a parchment white. Eggs are frequently laid away from the nest, scattered on the pampas, for after the male begins sitting on the eggs he drives the hens away furiously, forcing them to deposit the eggs at random.

The Long-billed Rhea (*R. macrorhyncha*), a bird similar in size and habits to the one just described, is found only in northeastern Brazil. It is browner in color and has the crown darker and the bill longer. It must be quite rare.

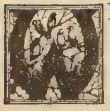
The smallest of the Rheas is known as Darwin's Rhea (*R. darwini*), the first specimen having been obtained by him while on the celebrated voyage of the *Beagle*. It is only thirty-six inches in length and is found in Patagonia, mainly south of the Rio Negro. "When pursued it frequently attempts to elude the sight by suddenly squatting down among the bushes, which have a gray foliage, to which the color of its plumage closely assimilates." It has much the same habit of holding up the wings when running as the Common Rhea, but usually it runs with its neck stretched forward, thus making it appear even lower than it really is. The nests are similar to those of the other species, each often containing 50 or more eggs. The eggs when first laid are a deep, rich green; this fades to a yellowish, then a stone blue, and finally almost white. Many waste eggs are found at a distance from the nest.

Darwin's Rhea was formerly very abundant, but the fluffy wing-feathers were exported in large quantities to be used in the manufacture of feather dusters, and as a result the birds have become extremely scarce except in the far interior. They were captured, as are the other species at the present time, by means of the *bolos*, the well-known South American sling. The one used for Rheas consists of two half-pound leaden balls connected by eight feet of twisted rawhide twine. When thrown with proper precision it entangles the legs of the birds, and they become an easy prey. The birds are approached on a fleet horse until within proper throwing distance, or sometimes a whole community of natives unite in enclosing a large area of country, driving the birds towards a constantly decreasing circle, when they are all captured. In recent years firearms have been resorted to, and it would seem that these splendid birds are likely to be wholly exterminated unless steps are taken to protect them.

CHAPTER X

THE EMEUS AND CASSOWARIES

(Order *Casuariiformes*)



WHILE it is perhaps hardly correct to assert that the Emeus and Cassowaries, which comprise the present order, are actually the most primitive of the Ratites, it is beyond question that they must have arisen from the original procarinate stem at a point very near those which gave rise to the Ostriches and Rheas. In any event they now differ from them in a number of important particulars, such as the absence of the ambiens muscle and the possession of a distinct aftershaft to the feathers; in fact, the latter is so enormously developed as to be of practically the same length and size as the main shaft. Another of the important differences is the extreme reduction of the wing in the members of the present group, for, as Dr. Stejneger says, it "could hardly become smaller without disappearing altogether externally." There is but a single claw-bearing finger instead of three such as in the Ostrich, while the absence of the ornamental wing-plumes — and for that matter, of tail-plumes as well — serves to further distinguish them. They have very strong legs and feet with three toes, the hallux or hind toe being absent, while the three front toes are provided with claws and have the middle phalanges somewhat shortened. The plumage is quite hair-like in appearance and somewhat harsh to the touch.

The *Casuariiformes* embrace two families, the *Dromœidæ*, or Emeus, and the *Casuariidæ*, or Cassowaries, each with a single living genus.[1] The Emeus are distinguished by their larger size, a feathered neck and head, by a broad bill, and the absence of a casque or helmet on the head. The bill has the culmen at the base elevated and sloping to the tip, which overlaps that of the lower mandible; the oblong-oval nostrils are placed in a large membranous groove. The wings are entirely without remiges and the tail is not apparent, while the toes are unequal, the inner one being the shorter, and provided with strong, obtuse claws.

The second family (*Casuariidæ*) is distinguished by the smaller size, a long compressed and keeled bill, with the suboval nostrils in the middle of a broad membranous groove, while the head is ornamented by an elaborate bony helmet. The head and neck are destitute of feathers, the skin being brightly colored in life and the neck wattled. The wing bears about five long, stiff, rounded, webless quills, and the inner of the rather long toes is provided with a very long, powerful claw, the claws of the other toes being of moderate size, curved and obtuse.

[1] A number of fossil Emeu-like birds have sometimes been set aside as a distinct family — the *Dromornithidæ*, — but their consideration is omitted here.

THE EMEUS

(Family *Dromæidæ*)

With the exception of the Ostriches, the Emeus are the largest of existing birds, a fully matured individual of the largest species attaining a maximum length of about eighty inches, and standing considerably over five feet high. They are exclusively confined to the deserts and plains of Australia, where they fill the place occupied in similar districts by the Ostriches of Africa and the Rheas of South America. They constitute as conspicuous and characteristic a feature of the Australian landscape as do certain of the larger kangaroos, and like them were being pushed back by the encroachment of civilization until actually threatened with extermination, though recent legislative enactment has done much to protect them. "The King of the Australian fauna" the bird has been called, and, adds Mr. Campbell, "whether seen in private reserves, parks, or in the open, the Emeu always attracts attention. Even the Bushman, who has seen hundreds of Emeus in the wilds, will always glance at the bird or remain to admire its handsome eggs."

Before recounting the life history of these remarkable birds, a word of description may be given of the several forms. As at present accepted the genus Dromæus comprises six nominal species, three of which are known from the Pleistocene deposits of Queensland and East Australia, and one (*D. ater*), which was exterminated some seventy five years ago, while the remaining two are living. Of these, the largest species and the first to be made known, the Emeu *par excellence* (*D. novæ-hollandiæ*), is found throughout Australia in general, though most abundantly in the eastern districts. At a little distance its coat has more the appearance of hair than feathers, due to the loose texture, while down the back there is a parting, where the plumage falls gracefully over on either side. The general color is obscure grayish brown, the feathers with black tips. The feathers of the head and hind neck are black, short, hairy, and recurved, and so thinly placed that the purplish blue color of the skin shows through. The female is similar in coloration to the male, being only somewhat lighter; in size she is slightly smaller than the male. The chicks are grayish white with two stripes of black down the back and two others on each side, each subdivided by a narrow middle line of white. The other living species is the Spotted Emeu (*D. irroratus*) of western Australia, which is easily distinguished from the other by its spotted plumage, the feathers being barred alternately with silky white and dark gray throughout their length, terminating in a black tip margined posteriorly with rufous. It is also much more slender in habit, the tarsi being longer and thinner, and the toes longer and more slender. The remaining species (*D. ater*), now extinct, was very much smaller, attaining a length of only about fifty-five inches, and was darker in coloration. It was apparently confined to Kangaroo Island, South Australia, where it was discovered in 1803 by the French expedition under Baudin. The naturalist of the expedition, Péron, captured three of these Emeus alive and took them to Paris. "A pair was sent to the residence of the Empress Josephine, and the remaining one to the Jardin des Plantes. In 1822 two of the

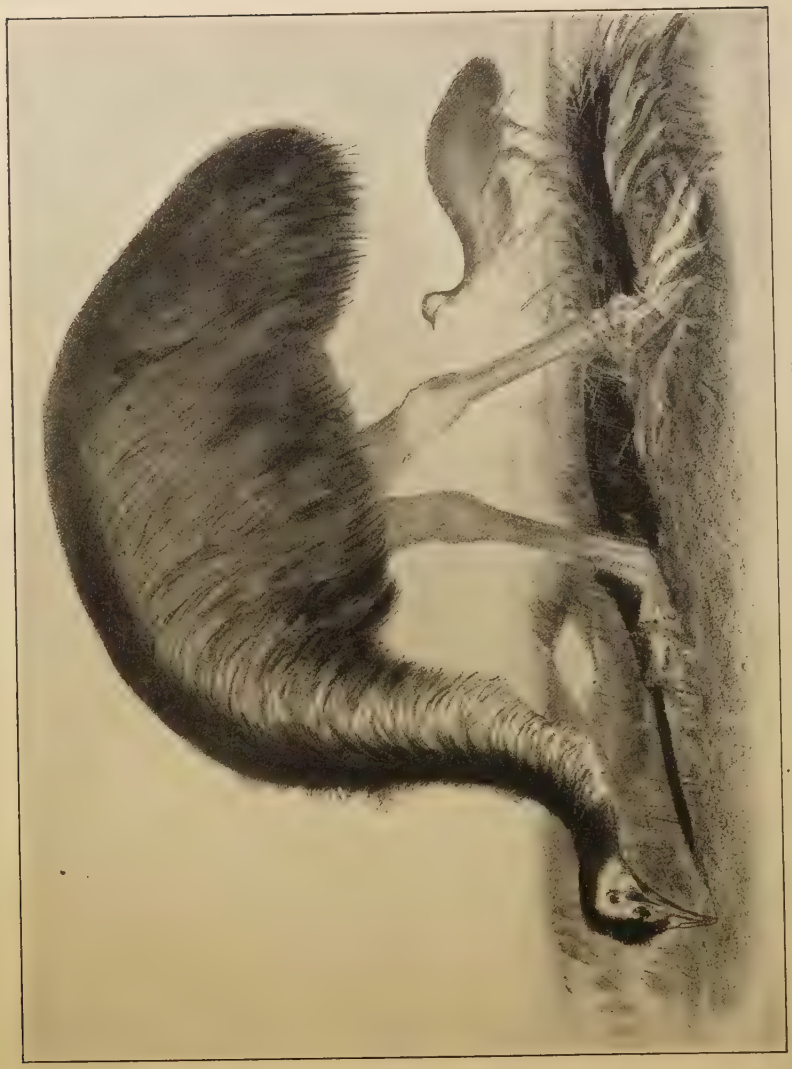


Fig. 25. — Emeu, *Dromæus novæ-hollandiæ.*

birds died. One was stuffed and the other mounted as a skeleton," and until a few years ago this was supposed to represent all that was known of the species. In 1901 a skeleton, believed to be that of the other bird brought back by Péron, was found in the Zoölogical Museum of Florence, thus closing the melancholy history.

Habits. — As the habits of the two living species are similar, the following account is mainly that of the principal species (*D. novæ hollandiæ*). Emeus prefer the more open country, or that but sparsely wooded, and go about usually in parties, it being not uncommon to see as many as twenty or thirty in company. They are shy, wary birds, of keen sight, and when disturbed run strongly and rapidly, usually trusting to their fleetness to escape danger, though a brooding bird when he thinks himself unobserved may occasionally stretch out the neck on the ground and trust to the similarity between his plumage and the surrounding herbage to escape detection. Emeus subsist on fruits, seeds, roots, and herbage, generally feeding in the morning or evening. They drink water freely, delight in bathing, and can swim well, being not infrequently observed in crossing rivers of considerable width. Their ordinary note is a hissing or grunting sound, but during the breeding season they utter a loud booming note, the latter produced apparently through the agency of a curious modification of the windpipe, this organ being pierced by a slit in front of, and communicating with, the tracheal pouch. The nest is a very simple affair, in the plains country being simply a hollow scratched in the earth, but in the other places, according to Campbell it is "usually a flat bed or platform composed of grass or other herbage plucked by the bird round about the site, and trampled down. Sometimes bark, pieces of sticks, and leaves of trees are used, intermingled with a few of the bird's own feathers. The shape is generally oval, about four feet by two and a half feet in size, and about two inches in thickness." The nest is placed in open country, frequently at the base of a tree or stump. The eggs, usually about nine but varying from seven to as many as eighteen, are very beautiful, being rough with "granulations of dark green upon a shell of light metallic or verdigris green," giving them the appearance of shagreen. In size the eggs average about 5.15 × 3.50 inches, the weight being approximately twenty ounces, or about the equal of a dozen ordinary fowl's eggs. When fresh the eggs are very palatable, a single one making a substantial meal for a family. The nesting season is very early, terminating in late winter or early spring, so that the young are hatched just as the tender grass and shoots on which they feed are coming forth. The period of incubation is about eight weeks, the male, who is strictly monogamous, apparently taking full charge of this office as well as that of rearing the young, as it is not known that the female takes any part in this duty. Both the eggs and flesh of the Emeu are eaten by the aborigines, but the flesh is too rank and tough to appeal to European palates, though they sometimes use the oil made from the fat beneath the skin. The hunting of Emeus by dogs has been considered good sport, and while doubtless still indulged in to some extent, is now discontinued by law. The Emeu is readily domesticated and when properly handled makes quite an engaging pet. It breeds readily in semi-confinement in England and other parts of the world.

THE CASSOWARIES

(Family *Casuariidæ*)

The Cassowaries are more numerous in forms than the Ostriches, Rheas, and Emeus combined, as Rothschild, in his magnificent monograph of the genus, recognizes eight or nine species and ten or more subspecies, and states that, owing to the uncertainty of localities whence have come many of the living specimens brought to Europe, and the disappearance after death of the most characteristic coloration of the bare skin of the head and neck, our knowledge of the species is doubtless still limited. They are confined in their distribution to the Papuan subregion, *i.e.* New Guinea with the islands in Geelvink Bay, Salawatti, New Britain, probably the Solomon Islands, the Aru group, northern Queensland, and the island of Ceram in the Moluccas. They are curious, large birds, some of them standing five feet or more in height, and perhaps their most marked external character is the peculiar bony helmet or casque on the forehead, this, and the naked head and neck, being brightly colored; the skin of the neck is also much carunculated and wattled in various places. The bill is generally shorter than the head, laterally compressed and with the culmen curved downward near the tip, while the wings are quite rudimentary, the only external evidence being some five or six long, black, barbless quills; there are no tail-feathers. The legs and feet are very strong, for they too are very fleet of foot. As already indicated, the two outer toes are provided with obtuse curved claws, while the inner is armed with a long, straight, powerful, pointed claw, "which is a dangerous weapon." As in Emeus the body is covered with stiff, hair-like feathers in which the aftershaft is as long as the principal shaft. "The old birds are black, the young ones brown, and the nestling, when hatched, is striped longitudinally above."

The following account of their habits is from Rothschild: "All Cassowaries are inhabitants of forests, while the rest of the large living *Palæognathæ* are denizens of steppes and deserts. Their food seems to consist of all sorts of vegetable matter and fruits; but they also pick up insects and any creeping thing that comes in their way. In captivity, at least, they kill and devour chicks and small birds when they come across them. They also, like Ostriches, Rheas, and others, swallow quantities of stones and gravel to assist digestion. They are entirely diurnal, sleeping from sunset till morning.

"The voice of the Cassowaries is a curious sort of snorting, grunting, and bellowing, usually not very loud, and differing according to the species.

"Their temper is generally sullen and treacherous, and they are extremely pugnacious, even the different sexes often fighting at other seasons than the breeding season."

The nest is placed on the ground, often in a pile of leaves, and, unlike many of their relatives, only one female lays in a nest. The eggs vary from five to eight in number, and have a strong, coarsely granulated surface. "When fresh they are evidently all of a light green color, but when exposed to the light they become first more bluish, then grayish, and finally almost cream-colored."

In size they are between five and six inches long and about three and one-half inches broad. Wallace, deriving his information from native sources, says of the Ceram species that both male and female take turns in sitting on the eggs, but from observations made on birds in captivity it appears that the duties of

Fig. 26. — Bennett's Cassowary, *Casuarius bennetti*.

incubation fall entirely on the male, who also assumes charge of the young until they are able to shift for themselves.

The Cassowaries, according to Rothschild, are easily separable into three groups, based on both external and anatomical characters. Externally the groups may be distinguished as follows: 1. The casque compressed laterally; the fore neck with two wattles. This embraces two species, *Casuarius bicarunculatus* and *C. casuarius*, with seven subspecies. 2. The casque depressed in

front; fore neck with a single wattle. Of the one-wattled Cassowaries there are two species (*C. philipi* and *C. uniappendiculatus*) and four subspecies. 3. The casque as in the last but the fore neck without a wattle. These forms, called the Mooruks, include four species, *C. papuanus*, *C. picticollis*, *C. bennetti*, and *C. loriæ*, each, except the last, with two subspecies.

It will not be possible in the space at command to give descriptions of all the species, nor is this perhaps desirable, but I venture to attempt a pen picture of one or two. The oldest known species is the Common or Ceram Cassowary (*C. casuarius*), a specimen of which was brought alive to Amsterdam in 1597. It is a species of moderate size, with a large, though not high, sloping casque of a dark brownish horn color. The head and occiput are Nile-blue, darker in the upper part of the hind neck, the lower two thirds of which is scarlet, while the chin, throat, and fore neck are dark blue. The wattles are large, lappet-shaped, much roughened, and of a deep pink color. The naked lower sides of the neck are bluish purple in front and bright scarlet behind. The plumage is of course black throughout. This species is reported to be rather abundant in the interior of Ceram, but it is extremely shy and difficult to approach, so much so, indeed, that no European naturalist appears to have seen it in the wild state. The eggs are said to be excellent eating.

The Violet-necked Cassowary (*C. c. violicollis*), a subspecies of the last, is found in Trangan Island, of the Aru group, and takes its name from the bright violaceous color of the neck. The type specimen is now living in England, and Rothschild thus describes its so-called "song": "It lowers its head and neck and remains in this position — with head and neck stretched out straight in front — for about fifteen seconds, with the bill open and gradually inflating its neck, without making a sound; then, bowing and jerking its head so that the bill and wattle clap together, it emits some barking grunts, apparently with great effort."

Still another subspecies is the Australian Cassowary (*C. c. australis*) of northern Queensland. It is a very large form, with the wattles more than five inches in length. Its habits have been very entertainingly described by Edward Spalding, as quoted in the Rothschild memoir, and among other things he says: "I have found the Cassowaries to be excellent swimmers, and frequently tracked them across a good-sized creek or river. On Hinchenbrook Island, situated about $1\frac{1}{2}$ miles from the mainland, they have been frequently met with."

Mr. Spalding had a young specimen in captivity for some time and speaks of its voracious appetite. "This bird has frequently devoured at a time as much as three quarts of 'loquats' and several fair-sized oranges whole, besides its usual amount of bread per diem, about three pounds. . . . In confinement they become very tame, and may be allowed to walk about the place without restraint, coming when called, or more often running after and following after any one accustomed to feed them. If disappointed or teased, they not infrequently 'show fight' by bristling up their feathers, and kicking out sideways or in front with force sufficient to knock a strong man down, — a feat I have

witnessed on more than one occasion. These birds are very powerful, and dangerous to approach when wounded. On more than one occasion a wounded bird has caused a naturalist to take to a tree; the sharp nail of the inner toe is a most dangerous weapon, quite equal to the claw of the large kangaroo, and capable of doing quite as much execution."

CHAPTER XI

THE TINAMOUS

(Order *Crypturiformes*)

THE New World, from the southern portions of Mexico to the extremity of South America, is the home of a remarkable group of land birds known as Tinamous (*tinamoos*). They have a strong superficial resemblance to the game-birds, and in fact are usually called Partridges in the countries where they live, and for a long time were supposed by ornithologists to be related to the game-birds, but comparatively recent studies have settled the fact that there is little or no real relationship between them. They have compact bodies, and rather short stout legs, while the head is small, the mouth split to under the eyes, and the neck rather long and slender. The wings are short and rounded and the tail-feathers short, or even altogether absent. In general the color of the plumage is deep yellowish or brownish, marked above with dark brown and black bars, and interspersed among the feathers are numerous powder-downs, or feathers which are continually breaking off the tips into a fine powder-like substance. The Tinamous have quite a well-developed keel to the breast-bone but possess only limited powers of flight. They are, however, very rapid runners and can rarely be forced to take to wing. When they do, they may fly for one or two thousand yards, and may repeat flights of this distance once or twice, but then their endurance fails and they can fly no more. Hudson, writing of their flight, says: "The bird rises up when almost trodden upon, rushing into the air with a noise and violence that fill one with astonishment. It continues to rise at a decreasing angle for fifty or sixty yards, then gradually nearing the earth, till, when it has got to a distance of two or three hundred yards, the violent action of the wing ceases, and the bird glides along close to the earth for some distance, and either drops down or renews its flight. The Tinamou starts forward with such amazing energy until this is expended and the moment of gliding comes, that the flight is just as ungovernable to the bird as the motion of a brakeless engine, rushing along at full speed, would be to the driver. The bird knows the danger to which this peculiar character of its flight exposes it so well that it is careful to fly only to that side where it sees a clear course. It is sometimes, however, compelled to take wing suddenly, without considering the obstacles in its path. In the course of a short ride of ten miles, during which several birds sprang up before me, I have seen some of these Tinamous dash themselves to death against a fence close to the path, the height of which they had evidently misjudged. I have also seen a bird fly blindly against the wall of a house, killing itself

instantly." He also mentions once riding over the pampas in the face of a violent wind, when a bird was startled from under the feet of his horse. "The bird flew up into the air vertically, and, beating its wings violently, and with a swiftness far exceeding its ordinary flight, continued to ascend until it reached a vast height, then came down again, whirling round and round, striking the earth a very few yards from the spot where it rose, and crushing itself to a pulp by the tremendous force of the fall." The explanation was that the strong wind

Fig. 27. — Rufous Tinamou, *Rhynchotus rufescens.*

had directed the flight upward with a force that the bird could not control, until it was exhausted and fell.

Some of the Tinamous inhabit open, grassy country, and depend much for safety in concealment among the grasses which they closely resemble in color, while others are quite as distinctly forest birds. They subsist largely upon seeds and berries, and they have a very distinct and flute-like song. They are, however, looked upon as rather stupid birds, some of the species being very tame, often coming around the houses, when they are killed with a stick, whip, or stone. They are often caught by a horseman riding around them in a decreasing spiral, or even picked up with a noose on a pole. The fact that they are esteemed as food combined with their stupidity and confiding disposition have brought about their extermination in certain localities. They are rather solitary in their habits, although several may usually be found within a short distance of one another, and occasionally they are found in coveys of a dozen or more. The nest

is simply a hollow scratched by the birds at the base of a tussock of grass, a thistle, or low bush, and slightly lined with grasses, feathers, and dry leaves. The eggs are among the most remarkable produced by any living bird. They vary in number in the different species from five to eight to twelve or sixteen, or possibly when of the latter number, one or more females may lay in the same nest. They are elliptical in shape, and have the shell polished until it appears like a piece of highly burnished metal or glazed porcelain. The color, which seems to be constant for particular species, is very variable, ranging from "pale primrose to sage-green or light indigo, or from chocolate-brown to pinkish-orange." The minute structure of the egg-shell has been studied by a German investigator with the result that they are shown to resemble the eggs of the Kiwi of New Zealand most closely. The male parent is said to perform the duty of incubation, and the young are very soon able to care for themselves.

Taking everything into account it appears that the Tinamous are a sort of connecting link between the typical flying birds and the so-called flightless birds, or those that are destitute of a keel to the breast-bone. They possess characters undoubtedly relating them to each of these great groups, but they are perhaps best placed among the Ratite birds, immediately succeeding the Ostriches, Cassowaries, etc. About forty species of Tinamous are known, ranging in size from the Little Tinamou of Brazil and Paraguay, which is only six inches in length, to the Rufous or Great Tinamou (*Rhynchotus rufescens*) of Brazil and Argentina, which is fourteen inches long. They are divisible into two quite well marked groups, according to the presence or absence of a distinct hind toe.

CHAPTER XII

THE MOAS

(Order *Dinornithiformes*)

IN the European occupation of New Zealand half a century or more ago great numbers of the bones of gigantic birds were found strewn over the surface of the plains or lightly buried in alluvial river-banks, lake-beds, and swamps, as well as caves and crevices among rocks. These birds were known by the native inhabitants as the Moa, and it was supposed from the abundance of the remains and their generally good state of preservation that their extinction had been of comparatively recent date. There are differences of opinion, however, as to the extent of the knowledge of the living Moa among the Maoris, the native inhabitants, and on this point the Rev. William Colenso, sometime Bishop of New Zealand, who first went among them about 1837, asserts positively that he found no evidence in the traditions and folklore of the Maoris that they had ever seen the Moa alive, or had knowledge of Moa-hunting. This is surprising, for it is well known that among savage people even trivial incidents are handed down for generations, and anything so important as the wiping out of their chief food supply would seemingly have been abundantly commemorated in song and legend. It appears that the Maoris have only been in their present location for about ten generations, or some 250 or 300 years, and the Moa could hardly have lived within that period, and it is held as probable that their extinction was several centuries earlier than this. On the other hand, some observers claim to have found traditional evidence among the natives of their having hunted these great birds, and as will be shown later, several fragments have been found in such a perfect state of preservation as seemingly to preclude the probability of their being very old. But that there was a race of people who subsisted largely if not entirely upon this bird, and who are apparently very largely if not wholly responsible for its extinction, is abundantly shown. In many localities extensive camping grounds have been found where there were cooking places, employed evidently in cooking the eggs and flesh of the Moa. Some of them contain great numbers of fragments of egg shells, and by the sides of others are refuse heaps containing hundreds of Moa bones, as well as vast numbers of crudely chipped stone implements, together with a few of more polished workmanship. Therefore it seems hardly likely that the Moas could have been living at best on the North Island within the past 500 years, although it is possible that on the South Island they may have lingered for a considerably later period, since in several instances, especially in the province of Otago, fragments have been

FIG. 28. — Skeleton of *Dinornis maximus*. (Courtesy of the U. S. National Museum.)

found at the bottom of refuse heaps, in caves, and even in river deposits, that contain portions of the skin and ligaments, and with fairly well preserved feathers still attached. It has been suggested that possibly the Moa was domesticated or herded by the natives, but there is hardly more evidence to support this than the notion that a few examples may still be living in the remote, unexplored interior.

One of the best preserved specimens retaining the skin and feathers was found in a cave at the foot of the Obelisk Hills, Otago. It is a portion about seventeen inches in length from near the base of the neck, which at this point appears to have been about eighteen inches in circumference. The skin, which is about three sixteenths of an inch thick, is of a dirty red brown color, and is formed into deep transverse folds. The surface is roughened by elevated conical papillæ, from the apex of some of which springs a slender transparent feather barrel, about half an inch long. On the dorsal surface some of the quills still carry fragments of the webs, a few of which are two inches in length. In color these barbs are chestnut-red, much as in certain species of *Apteryx*. Fragments of egg-shells as already mentioned are of common occurrence about the ancient cooking places, and now and then a more or less perfect shell is unearthed. Of these one of the most perfect came to light in 1901, having been washed from a bank some fourteen feet below the surface on the river Molyneux, Otago. This egg, which is described as of the usual pale buff color and is absolutely unbroken, measures seven and three quarters inches in the long diameter, and five and one quarter inches in the short diameter. Another nearly perfect example from the same locality was slightly larger, and a fortunate specimen found some years ago near Tiger Hill, in the interior of Otago, contained the well-developed bones of an embryo chick that must have been about fourteen and one half inches long, and well showed the massiveness of the posterior limbs. The egg-shell when not abraded is usually of a pale yellow color, smooth, and irregularly pitted on the outside with dots and linear markings. Its structure has been studied under the microscope and found to agree most closely with the eggs of struthious birds, and more especially with those of the Rhea or South American Ostrich.

Although previously observed by missionaries among the Maoris, the first Moa bone brought to scientific attention was in 1839, when Sir Richard Owen exhibited a portion of a femur before the Zoölogical Society of London. Since that date many thousands of bones have been collected and studied with the result of determining the existence of between twenty and thirty species, with a range in size from that of a very large Turkey, to *Dinornis maximus*, which possessed a tibia thirty-nine inches long and probably stood nearly ten feet high. Certain of the species appear to have been rare, while others, especially the smaller forms, were exceedingly abundant. In draining a swamp at Glenmark, near Canterbury, the soil was found to be literally full of Moa-bones, disposed in all sorts of positions, and more recently another small pond in the same region was drained, and in a space of twenty by thirty feet over 2500 bones were recovered, representing, it is thought, not less than 800 birds. In another locality where a ledge of rocks jets into a lake, thus forming a cul-de-sac, no less than thirty-nine

skeletons were found on the surface and so nearly in the positions in which they died that the pebbles that had been taken into the gizzards were located and collected. The causes which led to these mortalities are, and of course must remain, unknown, but it has been conjectured that glacial agencies may have had something to do with it, or possibly those found in the cul-de-sac were driven in by fire and cut off from escape by the water and the rocky ledge.

The Moas were flightless birds, so distinctly so, indeed, that in most cases every bone of the wing had disappeared. Even the coracoid and scapula are aborted or absent, and the breast-bone, which in shape may be broad and short or long and narrow, is without trace of a keel, and its grooves for the reception of the coracoid are either reduced to small facets or have totally disappeared. Coincident with the loss of the power of flight, which was doubtless brought about by the absence of predatory land animals which made the frequent use of the wings unnecessary, the hind limbs were greatly developed and made massive, though not quite to the extent found in the Elephant-birds of Madagascar. The tibia, which in the different species varies in length from about nine and one-half to some thirty-nine inches, is chiefly remarkable for the presence of a bony bridge at the lower end in front, which distinguishes the Moas from all living Ratites. There were three toes directed forwards and in most cases one directed backwards. The number of vertebræ is absolutely known in only one species (*Anomalopteryx parva*), there being in this twenty-one in the neck, and six free dorsals. The skull, which, however, differs considerably in the several genera, was generally broad and low, with a wide U-shaped or V-shaped and somewhat deflected beak. The feathers have a distinct and large aftershaft, as in the Cassowaries, and the webs are soft and dissociated. From the stoutness of the bill it is inferred that they subsisted largely on vegetation, such as succulent stems, seeds, and berries, with doubtless an occasional insect or reptile.

The Moas appear to find their nearest relatives among the Kiwis, and it has been assumed that like them the females exceeded the males in size, but recent studies indicate that this was probably not the case. They differ from them, however, in the short beak, and feathers with aftershafts, as well as in certain anatomical features. They were most abundant on the South Island, but were present on the North Island, and a single rather doubtful species, based on one bone, has been reported from Australia.

CHAPTER XIII

THE ELEPHANT-BIRDS

(Order *Æpyornithiformes*)

A FEW years after the discovery of the Moas in New Zealand another race of gigantic extinct birds came to light in Madagascar, and in a peculiar manner. Some natives visiting the Mauritius for the purpose of buying rum brought with them as receptacles to contain the liquor two enormous egg-shells. These eggs, together with a portion of the metatarsus of a bird, fell into appreciative hands, and were sent to Paris, where M. I. G. Saint-Hilaire brought them before the Paris Academy of Sciences, giving the bird the name of *Æpyornis maximus*, signifying literally "the bird as big as a mountain." As may be supposed, this discovery excited great scientific interest, and, as Stejneger says, "brought to mind the old story of the famous Venetian traveler, Marco Polo, who located the Ruc or Roc, the giant bird of Arabian tales, upon Madagascar." Shortly after this the question was taken up seriously by Professor Bianconi, who attempted to prove its truth, since it was thought possible that Polo actually might have heard rumors of the existence of these immense eggs and the presumably gigantic bird that laid them. These vague speculations are perhaps not to be much wondered at, as the eggs were larger than any before dreamed of, measuring more than thirteen inches by nine and one half inches and having a capacity of more than two gallons. This discovery stimulated exploration, which has resulted in bringing to light vast quantities of broken egg-shells, occasional entire shells, and a considerable number of bones, from which have been described two quite distinct genera and thirteen nominal species of Elephant-birds. It has been determined that they ranged over the whole of the southern half of Madagascar, but were apparently most abundant in the south and the southwestern portions. The bones are found principally in the beds of ancient shallow lakes, those along the coast being very salt, those of the interior of course fresh, and now used by the natives as rice-gardens. The eggs, however, appear to be found only or very largely in the sand-dunes along the coast. On this point Mr. J. T. Last, who made extensive explorations in the interests of the Zoölogical Society of London, says: "During all my explorations, though I have found the bird's bones a long way inland, I have never seen any fragments of eggs either with them or inland anywhere. Everywhere along the south and southwest coast fragments are to be found in abundance, especially on the hillsides about St. Augustin's Bay. Bushels of broken egg-shells could be gathered in this district with but little trouble. From this I judge that the birds used to live

generally in the more inland parts of south-central Madagascar and at certain seasons came to the coast to lay their eggs, after which they betook themselves again to their inland homes. I do not know whether this idea is quite correct, but it seems to me very probable, from the fact that their eggs, both whole and broken, are only found on or near the seacoast."

Although the Elephant-birds have not been found to be as large as was at first supposed, the largest not exceeding the height of an Ostrich and the smallest being about the size of a large Bustard, they were nevertheless of large size, chiefly remarkable for the great massiveness of the hind limbs, the leg bones in the largest species (*Æpyornis maximus*) being about thirteen inches long and eighteen inches in circumference at the upper extremity. Normally they appear to have had four toes, but in some the back one (hallux) was wanting. They had apparently a relatively small skull, but this is imperfectly known, and an unusually short and broad breast-bone which is without trace of a keel. The wing was quite rudimentary, and they were of course flightless. These birds appear to find their nearest relatives among the Cassowaries and Emeus, but many points in their structure remain to be elucidated and interpreted.

The natives of Madagascar still assert that some of these great birds are yet living in the interior, but this is highly improbable, and it seems hardly likely that any have existed within the past two or three hundred years. The manner of their extermination is unknown, but it is more than likely that it was brought about by the hand of man. If their breeding grounds were localized, as seems probable, it would only have been necessary to persistently destroy the eggs to have caused their ultimate extinction.

CHAPTER XIV

THE KIWIS, OR WINGLESS BIRDS OF NEW ZEALAND

(Order *Apterygiformes*)

OF the many strange birds found in various parts of the world, perhaps none is more curious and generally interesting than the Kiwis, or so-called Wingless Birds of New Zealand. They are, for the great group to which they belong, birds of small size, being only as large as or slightly larger than a domestic fowl. They have a rounded, compact body, a rather short neck, and small head, while the bill is very long, slender, slightly curved, and bears the small slit like nostrils near the tip, the latter a condition not found in any other birds. The base of the bill is covered by a hard cere and surrounded by numerous long, stiff bristles. They have relatively very powerful thighs and legs, the latter covered with scales of various sizes, and four toes, three of which are directed forward, and one, very short one, backward; all the toes are provided with claws which are long, strong, and acute. The plumage is fluffy and quite hair-like in appearance, each feather being pointed and composed of separate loose filaments; there is no aftershaft. It was formerly supposed that the feather covering was continuous over the body, but it is now known that there are several small bare spaces. The wings are not quite absent, as the name implies, but are extremely aborted, consisting of a rudimentary humerus and one complete digit. There are, however, no definable wing-quills, and in fact the wings are entirely concealed by the plumage of the back; they are of course useless for flight and the birds are practically "wingless." The reduced condition of the wing is further emphasized by the fact that the sternum is without a keel. The tail is also practically concealed, there being no tail-feathers. In color the plumage is brown or grayish brown, barred across with lighter, or with each feather dark on the margins and lighter along the middle. As a structural character of importance it may be mentioned that Mr. Beddard has recently noted the presence of a very large oil-gland, which in many particulars is quite unlike that of any other bird. Instead of consisting of two lobes or sacs located a little way from the end of the tail, as in most birds, there is a single very large gland with two nipples which form the very extremity of the bird.

Habits. — Although first located near the Penguins, the structure of the Kiwis shows them to be essentially struthious, and they are now appropriately placed at the end of the Ratite series. That they constitute an ancient group is

shown by the fact that two fossil forms have been found in the late Tertiary beds of New Zealand and Queensland, while several species appear to have been contemporary with the Moa, as their bones are found mingled in many places. Their nearest of kin appear to have been the Moas, but among recent birds they are perhaps nearest the Emeus and Cassowaries, since, according to Parker, they all appear to have originated from a common stem. The females are uniformly larger than the males, sometimes exceeding them by five inches in total length. They are mainly nocturnal in their habits, remaining concealed in holes and dark places during the day and coming out at dusk to feed on worms, and probably insects, which they are adept at finding by probing in moist ground and among mosses and roots. They also take a certain amount of vegetable matter such as small grass seeds, berries, and tender bits of succulent plants. Their food requirements are very large, as a pair in captivity has been found to require more than a pound and a half of meat daily. Being of a hardy disposition, they are readily kept in confinement, Mr. Rothschild having had them alive in his aviary in England for ten years or more, where they were given a large run and fed on chopped raw meat, boiled potatoes, and soaked bread. They are rather stupid birds when disturbed during the day, and as they lift their sleepy-looking heads from under the mantle of long feathers on their shoulders, they crack their bills like the snap of the fingers, and utter a few hoarse grunts of disapproval, but at night they become exceedingly active, jumping about and running with the greatest speed. They make good use of their extremely powerful legs, being always ready to kick at any object approaching them closely. In kicking they usually strike forward like an Emeu or an Ostrich, but according to Mr. Rothschild they have been occasionally observed to kick backward. When taken in the hand they never attempt to defend themselves with their bills, but if taken by the head, they use their powerful legs and sharp claws with sufficient force to rip open a dog's leg or cut a man's hand to the bone. Regarding the notes of these birds, the above-mentioned authority states that the cry of the male of the North Island Kiwi is "a somewhat hoarse, shrill whistle, often distinctly like Ki-i-wi, often shorter, more in one syllable. The female answers in a less loud, harsher and shorter, more screaming note. The young and half-grown birds also, according to Sir Walter Buller, call to each other, the male in a thinner whistle and the female in a thick, husky way. Sometimes, but rarely, a low crackling or grunting note is heard, probably of both male and female. When angry they hiss audibly, and when feeding make a sniffling noise with their nostrils, evidently to clear them of extraneous matter." For a nesting site they prefer a hole in a bank or under the roots of a tree, with a single rather small entrance. They may make use of a natural cavity or enlarge it and adapt it to their needs, the female at least having the power and ability to burrow for some distance if occasion demands, as Buller once found to his dismay when several which he had confined in a pen escaped in this manner. In the dryest corner of the nesting burrow they arrange a slight bed of fern-fronds and leaves whereon they deposit one or perhaps sometimes two immense eggs, which seem quite out of proportion to the size of the bird. Certain New Zealand authorities state that it is not

uncommon to find a young bird a week old and a fresh egg in the same nest of the Roa. Thus the egg of the North Island Kiwi (*Apteryx australis mantelli*) is sometimes five and three tenths inches long by three and three tenths inches

Fig. 29. — South Island Kiwi, or Roa, *Apteryx australis.*

broad, while the bird itself is only about twenty-six inches in length; the egg of Haast's Kiwi (*A. haasti*) is said to be even larger. The eggs of the first-mentioned species weigh usually between twelve and fifteen ounces, and exceptionally as much as eighteen ounces. In color the eggs are pure white or slightly greenish gray, but soon become much nest-soiled. "The shell is very thin, the grain rather fine and totally different from that of all other struthious birds, more resembling that of the eggs of *Rallidæ* (Rails) or of *Otis* (Bustard)." The male appears to

take entire charge of incubating the egg (or eggs), and although the female is often found in the same hole, she has not been observed sitting on the eggs. The period of incubation is unknown, but is thought to be about six weeks, and at the close of his duties the male presents a sorry appearance, being poor in flesh and quite stupid, while the female is wide awake and full of fight, a reversion of the conditions prevailing before the egg was laid. The young are quite helpless when hatched, and are unable to stand up, but as soon as they acquire sufficient strength they accompany their parents.

The Kiwis are referred to a single genus (*Apteryx*), and to five and by some authorities to six forms. Rothschild, who has had a much greater number of specimens at his disposal than any previous student, recognizes five forms as follows: The South Island Kiwi (*A. australis*), known locally as the Roa, which has the plumage rather light colored and the feathers of the neck soft and less bristly to the touch. The male is about twenty-three inches in length and the female twenty-seven inches, while the bill, which is a clear horn-color, is about five inches long. This species, which is confined to the South Island and adjacent smaller islands, is still quite abundant in suitable locations, but like so many of the native species, it is yearly becoming rarer. A subspecies of this, known as Mantell's Kiwi (*A. a. mantelli*), found only on the North Island, has the plumage darker with the neck-feathers bristly and harsh to the touch. In both these forms the feathers of the upper side are striped, whereas in the remaining species the feathers of the upper side are barred. Of these Haast's Kiwi (*A. haasti*) of South Island is a very large species, the male attaining a length of twenty-five inches and the female about twenty-seven inches. It is light brown in color, with wide light bars, while Owen's or the Gray Kiwi (*A. oweni*), and its subspecies, the Larger Gray Kiwi (*A. o. occidentalis*), have the plumage more grayish, with narrower bright cross-bars; the species is confined to South Island and the subspecies to South Island and the southwestern portions of North Island. The form inhabiting Stewart Island was formerly considered distinct, but proves to be only a large, brightly colored strain of *australis*.

The Kiwis of Stewart Island were fast approaching extinction, but as the island has recently been set aside as a sort of game preserve, it is possible that it may survive for many years. The following entertaining account of its habits is by a Mr. Marklund, who was a resident collector before the island was protected by law. He says: "At the end of July I came down from the hills, and on this trip I found that the Kiwi were moving down to the lower country, probably for nesting purposes. After some practice with a leaf of wild flax held in a certain position between my two thumbs I can fairly well imitate their cry. I have discovered that the best time for these birds is a moonlight night, with a sky somewhat overcast. If it is too light, the birds will not leave the scrub. They also object to rainy weather. Though apparently insensible to pain when attacked by a dog, they are naturally very timid. If the moon is bright, their own shadow will sometimes cause them uneasiness; indeed, I have seen one make a kick at its own shadow on the ground, accompanied by that peculiar hissing sound they make when confined in a pen. I have noticed also that a smaller bird will run

as hard as his legs will carry him at the least show of anger from a larger and stronger one. By imitating their cry — the deep rasping one being the most successful — I have always had the clear, shrill one in response. If in the close neighborhood, I would then send in the dog, and it would always turn out to be the male. With this bird the ordinary relationship between the sexes appears to be reversed; for instance, it is the female that undertakes the defense of the house and home, for the male gives in after a very slight struggle; but the male is the faster runner of the two. After the young is big enough to follow its parents the male (not the female) seems to take special charge of it. The male has a high, shrill cry; the female utters a low, hoarse note — between a cry and a hiss. Although a nocturnal bird, its sight is weak even at night, for I have seen them running against objects that could easily be avoided; but their hearing and sense of smell are very acute. By going against the wind I have got to within ten feet of them and seen them feeding. They do not confine themselves to worms, but will also take any kind of vegetable matter available; for example, the young shoots of a very common alpine orchid. I have found three different kinds of seed and a small white berry in the stomachs of those I have opened."

CHAPTER XV

THE PENGUINS

(Order *Sphenisciformes*)

AT first sight it might seem that the Penguins were quite closely related to the Auks and their allies, since they have approximately the same shape and much the same habits of life; but the more closely the Penguins are studied the clearer become the differences, and it is soon seen that the resemblance is hardly more than accidental or superficial; in fact, taking everything into account, the Penguins constitute one of the most distinct and remarkable groups into which birds are divided. They are flightless birds, of moderate or large size, confined exclusively to the Antarctic region, where they occupy in a measure the position filled in the opposite hemisphere by the Auks and their immediate relatives. The wings are reduced in size and modified by the flattening and consolidation of the bones until the product is a perfect swimming paddle, for which purpose they are exclusively used. These birds are expert swimmers and divers, but unlike most other aquatic birds, they make no use of the feet in swimming beyond employing them as a rudder. The wings, or "flippers," as they might perhaps be called, are moved alternately, thus producing a screw motion, and the appearance of the birds in the water is little short of marvelous.

Moseley, the naturalist of the *Challenger* expedition, who mistook them at first for small porpoises or dolphins, says: "They came along in a shoal of fifty or more, from seawards toward the shore at a rapid pace, by a series of successive leaps out of the water, and splashes into it again, describing short curves in the air, taking headers out of the water and headers into it again; splash, splash, went this marvelous shoal of animals, till they went splash through the surf on to the black stony beach, and there struggled and jumped up amongst the boulders and revealed themselves as wet and dripping Penguins, for such they were."

Anatomy. — The bones of the wing, as might be expected from the altered function of this organ, show very great modifications. The shoulder-blade (scapula) is of enormous size and affords attachment for the powerful muscles of the shoulder joint. The coracoid bone is also of great strength. The other bones of the wing are much compressed laterally and are more or less fused or anchylosed until there is relatively little freedom of motion between them. The shoulder joint is as perfect in Penguins as in other birds, but the remaining portions of the wing are so arranged as to "almost entirely exclude those movements of flexion and extension which are essential to an organ of flight," and it is moved

as an almost rigid body. However, most of the muscles which are present in the wing of a flying bird are represented in the wing of a Penguin by tendons, showing beyond question that the present flightless condition has been produced by degeneration from an ancestor which enjoyed the power of flight.

While the bones of the leg are modified to a less extent than are those of the wing, they nevertheless present a number of peculiarities not met with in other birds. Thus the knee-cap (patella) is larger than in most birds, while the tarso-metatarsus is shorter and broader than in any known bird except the Frigate-bird, and retains its three elements in an incompletely fused condition (Fig. 17). In all other birds the fusion of these bones is not only complete, but in many cases is carried to such an extent that all evidence of individuality has disappeared and it appears as a solid bone. This incomplete fusion of the metatarsal bones was present in the earliest known fossil representative (*Palæeudyptes antarcticus* from the Eocene of New Zealand), which was thought to prove that modern Penguins have directly inherited this feature, though with fuller knowledge this seems to require modification. The toes, four in number, are all directed forward, a condition not unknown among other birds, yet of rather uncommon occurrence. When on land Penguins stand very erect, with drooping wings, and the whole of the metatarsus is applied to the ground, thus making them very "flat-footed."

Among other structural features it may be mentioned that the beak is usually long and straight, with its sides compressed and more or less grooved, and its tip never hooked but rather sharply pointed. The nostrils are slit-like and located within lateral grooves, while the palate is also of the split (schizognathous) type. The breast-bone, which is about half as broad as it is long, has a pair of notches at the back and a well-developed keel in front. Of the four toes the first is very small and joined to the inner sides of the metatarsus, while the other three are strong and completely webbed.

The feather-covering in the Penguins also affords another interesting feature. With the possible exception of the Screamers they are the only known birds in which there are no bare spaces (*apteria*). The feathers themselves are narrow, lanceolate, with a very broad, flat shaft, convex beneath, with the ordinary furrow of the lower surface usually wanting. The aftershaft is distinctly recognizable and is similar to the shaft. No specially formed quills can be detected in the wings, but in the tail stiff quills are usually distinguishable. Beneath the feathers or just under the skin are powerful muscles by means of which the water can be entirely shaken from the feathers as the birds emerge from the icy sea, — a fortunate provision, for otherwise, in the frigid temperature in which they live, they would be masses of ice in a few moments. The body temperature, stated by Mr. W. Eagle Clarke to be 102°–103° F., for the Adelie Penguin, is further equalized and maintained by a dense layer of fat beneath the skin not unlike the layer of blubber in seals and cetaceans. The moult takes place quickly, the plumage peeling off, as it were, in large patches, and disclosing to view a short undergrowth of new feathers, the whole process, according to Buller, requiring only two or three days. Other observers place the length of time of actual shedding as within ten days or two weeks. The moult of the King Penguin has been

observed in the gardens of the Zoölogical Society of London, and toward the close of the period the bird was always seen to be busy picking the feathers off, nearly all being removed by its bill, not pulled, but pushed off. "When the moult was nearly completed and only a few dried-up feathers adhered to the back and upper side of the middle of the wings, the epidermal covering of the orange-colored patches on the lower mandibles loosened and came off like pieces of parchment or dry bladder." This shedding of portions of the epidermal covering is well known in certain Auks and Puffins, but had not been observed previously in members of this group.

As already mentioned, when the Penguins are on land they stand erect, some species even holding the neck and head stretched vertically upward. They have the habit of disposing themselves in lines along the rocks or edges of the ice-floes, resembling at this time long lines of soldiers. Although they are extremely awkward in walking, especially when hurried, they nevertheless manage to get over the ground with considerable speed. Kidder, who observed them on Kerguelen Island, describes the gait as follows: "No living thing that I ever saw expresses so graphically a state of *hurry* as a Penguin, when trying to escape. Its neck is stretched out, flippers whirling like the sails of a windmill, and body wagging from side to side, its short legs make stumbling and frantic efforts to get over the ground. There is such an expression of anxiety written all over the bird; it picks itself up from every fall, and stumbles again with such an air of having an arm full of bundles, that it escapes capture quite as often by the laughter of the pursuer as by its own really quite considerable speed." But they are preëminently birds of the sea, swimming and diving with the greatest facility, coming to the surface and disappearing again with such rapidity that it is almost impossible to say if it be bird or fish. The length of time that one can remain under water is a little more than a minute, which is not an extraordinary accomplishment as compared with certain other birds. Their food consists entirely of fish, crustaceans, cephalopods, etc., which they seek in the open ocean, heedless of storm and waves, for it "must be hard weather indeed when a Penguin goes in search of shelter, as he enjoys the wildest surf and loves the roaring gale."

During the nesting period they resort mainly to the wildest and most inaccessible islands and isolated rocks in the southern seas. Here they come, or at least once did, in countless thousands. The nests of some of the species are placed on the ground, while others nest mainly in burrows or holes among the rocks, and it is said of at least the King Penguin that the egg is carried in a pouch or fold of skin between the legs, being laid down only for the purpose of changing it from one parent to the other. When on the ground the nests are rude affairs, consisting of a few grasses or are simply slight depressions scratched in the earth by the birds. The burrowing species of the Falkland Islands have modified their habits to some extent since the advent of civilization, now making these holes ten or fifteen feet long. The eggs are usually two in number, but apparently in some species there is but one; they are white or greenish white in color and possess a very thick shell. Both parents take part in the incubation of the eggs

and attend to the needs of the young with great care until they are able to shift for themselves. Notwithstanding this extreme care for the preservation of the young birds, Gould tells us that heavy gales of wind frequently destroy them in great numbers, hundreds occasionally being found dead on the beach after a storm. When sitting on the eggs or brooding the young, the old birds sit closely and if approached too near resent the intrusion with their powerful, sharp bills and are capable of inflicting severe wounds.

Penguin Rookeries. — Moseley gives the following graphic account of his visit to a large colony of Rock-hoppers: "You plunge into one of the lanes in the tall grass which at once shuts the surroundings from your view. The stench is overpowering, the yelling of the birds perfectly terrifying. The nests are placed so thickly that you cannot help treading on eggs and young birds at almost every step. A parent bird sits on each nest, with its sharp beak erect and open, ready to bite, yelling savagely, '*Caa, Caa, Urr, Urr*,' its red eyes gleaming, and its plumes at half cock, quivering with rage. No sooner are your legs within reach than they are furiously bitten, often by two or three birds at once. At first you try to avoid the nests, but soon find that impossible; then maddened almost by the pain, stench, and noise, you have recourse to brutality." Their gregarious habits and their inability to escape when on land have caused them to be greatly persecuted by man, as both eggs and birds are eagerly sought as food; for while neither birds nor eggs have a very delicate flavor, they are nevertheless a welcome addition to the larder after a long sea-voyage, and recently the Swedish and other South Polar expeditions were forced for many months to subsist almost entirely on their flesh and eggs. It was persecution of this kind, it will be recalled, that led to the extermination of the Great Auk, and from all accounts the Penguins are becoming sadly depleted in many of their breeding grounds.

As regards size there is considerable range, from the Blue Penguin (*Eudyptula minor*) of Australia and New Zealand, which is only about sixteen inches in length, to the Emperor Penguin (*Aptenodytes forsteri*) of the shores of the Antarctic continent, which has a length of forty-eight inches and a weight, according to Ross, Nordenskiöld, and others, of sixty to seventy-eight pounds. The length of the various species is between sixteen and forty-eight inches, the average being about thirty inches.

That the Penguins represent a group of great antiquity is shown by the discovery of numerous fossil remains as well as by the apparently primitive character of certain structural elements. The oldest known fossil form (*Palæeudyptes antarcticus*) is found in the Eocene of New Zealand, and according to Hector, was of gigantic size, standing between six and seven feet in height, although other authorities would make it no more than five feet. In any event it was considerably larger than the largest living species, and it had a proportionately longer wing, yet all of the important skeletal modifications had been already acquired. Within the past few years, thanks largely to the revival of Antarctic exploration, no less than thirty-one nominal fossil species belonging to nineteen genera have been described, of which number five genera and species were

obtained by the Swedish South Polar Expedition on Seymour Island only about two degrees below the Antarctic Circle, and the remainder by Dr. Florentino Ameghino in Patagonia, all, it is believed, in beds of Miocene age.[1] These remains have been studied by Drs. Wiman and Ameghino with the astonishing result of showing apparently that the earlier forms of Penguins, so far as shown by their limbs and especially by the tarsi, were much more generalized than the living species. The tarsi, while comparatively longer in the fossil species than in the living forms, had their component bones much less clearly indicated than in modern Penguins, which is exactly the opposite of what should prevail, if, as has been supposed, the tarsus of the living Penguin is a survival of the primitive free condition of these bones. In other words, it appears that the present-day Penguins, with their uniquely free tarsal bones, have been derived from forms in which these bones were more or less consolidated, which naturally brings them closer to ordinary carinate birds in which the tarsal bones are practically solid. This consolidation of the tarsal bones is possibly an adaptive feature which has perhaps been brought about "by the habit of sitting with the tarsus on the ground when at rest."

The relationship between the Penguins and other birds is rather hard to make out. Professor Watson, who studied the extensive material obtained by the *Challenger* expedition, regards them as the surviving members of a group that branched off early from the primitive "avian" stem, but "at the time of their separation the stem had diverged so far from reptiles as to possess true wings, though the metatarsal bones had not lost their distinctness and become pressed into the single bone so characteristic of existing birds." Pycraft has studied the anatomy of the group more recently, and, while he recognizes the fact that the skeletal specialization has reached the high-water mark, it does not, he claims, take us beyond the confines of the Class. He says: "Osteologically the Penguins seem to be nearly related to the *Tubinares* and *Pygopodes*, and, as Gadow and others have shown, the evidence of the soft parts confirms this supposition." Dr. Stejneger considers that the Penguins should be placed in a group of equal rank with the Ostriches and their allies, and the rest of living birds, that is to say that existing birds should be divided into three groups, of which the Penguins should constitute one. Others, and more especially Gadow, whom we are following, regard the characters as of somewhat less importance and would only accord them ordinal rank. Apparently we must look to paleontology for further light on this perplexing point, and this, as already pointed out, seems to indicate that the line separating them from carinate birds in general is less sharp than was formerly supposed.

Species. — About twenty living species of Penguins are known. They are confined exclusively, as already stated, to the Antarctic region, never crossing and rarely even approaching the equator. They are, perhaps, most abundant in species in the vicinity of the Falkland Islands, but they do not range north

[1] *Cladornis pachypus*, also from the Patagonian Miocene, is regarded by Ameghino as representing a divergent type of Penguin with a very thick leg, but it is imperfectly known, and seems hardly to belong here.

of Tristan da Cunha in the Atlantic or Amsterdam Island in the Indian Ocean, although they are common about New Zealand and the west shore of Australia, one species occasionally reaching as far north in the Pacific as the Galapagos Islands and another in the South Atlantic to the coasts of South and Southwest Africa. The causes governing their distribution within this area are not well understood, but apparently it does not depend wholly upon temperature, for at the most northern point reached by them the temperature of the sea is about 62°, and from this point they extend their range to water but little above the freezing point. They exhibit none of the tendencies to perform regular migrations, although they seem well enough fitted to undertake such journeys, and their distribution probably depends upon the food supply. The naturalists of the *Challenger* expedition did not observe them at any greater distance from land or ice than forty or fifty miles.

The six genera into which the Penguins are divided may be separated into two groups. In the first, which embraces only the genus *Aptenodytes*, both mandibles are long, relatively slender, and slightly curved downward at the tip, while in the second group the bill is of moderate length, and never has the lower mandible curved downward. To *Aptenodytes* belong the two largest species, the Emperor (*A. forsteri*) and the King Penguins (*A. pennanti*) respectively. The Emperor Penguin is bluish above and white below, with the top of the head, cheeks, chin, and throat deep black, while there is a large semicircular patch of orange yellow on each side of the head. The total length is about forty-eight inches and the distance between the tips of the flippers thirty-six and one half inches. They frequent the shores of the Antarctic continent. The King Penguin is much smaller, being only about twenty-six inches long and is similar in coloration to the other, except that the bluish gray of the upper parts inclines to pearl-gray on the back of the neck and shoulders, and the orange patches on the sides of the head continue as narrow bands down each side of the throat, and unite at the base of the fore neck, broaden into deep orange patches, which shade into yellow and disappear on the white breast and under parts. This species is found about the Straits of Magellan, Falkland, Marion, Kerguelen, Macquarie, and Stewart islands.

Somewhat closely allied to the above are the three species of *Pygoscelis*, of which perhaps the best known is the so-called "Johnny" (*P. papua*) of Kerguelen and the Falklands. About thirty inches in length, it has the upper parts slate-gray and the chest and under parts pure white, and with a broad white band across the crown between the eyes. Kidder found them nesting extensively on Kerguelen Island. When undisturbed the nesting sites were near the sea, but in other instances they were half a mile or more inland, and numerous very distinct paths have been worn by the successive generations, until in some cases they are as much as four feet in depth. As a rule two young were found to each old bird, and, he adds: "Singularly enough, one of these was always well grown, apparently from one to two months old, while the other had just been hatched or was still in the egg. It must, consequently, be the practice of these birds to rear two broods in a season, keeping both in the nest at the same

time." The other species are *P. adeliæ* and *P. antarctica*, both without the white band across the crown.

Distinguished by a stouter bill and an eyebrow band of more or less elongated golden feathers, are the five or six species of *Catarrhactes*, or Rock-hoppers,

Fig. 30. — Kerguelen Rock-hopper Penguin, *Catarrhactes chrysocome.*

as they are called from the habit of "hopping" rather than walking. The Kerguelen species (*C. chrysocome*) is about twenty-five inches in total length, dark slate above, with the top of the head black and the throat and belly white. The feathers of the crown and back of the head are elongated into a straggling crest three inches in length, while the stripes above the eyes are of golden yellow feathers quite three and one half inches long. Their nests, placed among the

loose rocks, were lined with dried grass, and each contained two white eggs, "of which one is usually larger than the other." "They were wonderfully courageous," says Kidder, "erecting their sulphur yellow plumes and trembling all over with excitement on my approach, while they kept up a strident cackling that was almost deafening." The remaining species are separated mainly on minor differences in the crest; all range from Tierra del Fuego and the Falkland Islands to New Zealand.

The smallest of the Penguins are comprised in the genus *Eudyptula*, of which two species are known. Of these we may mention the little Blue Penguin (*E. minor*) of the coasts of South Australia, Tasmania, New Zealand, and the Chatham Islands. It is slate blue above and pure white below, and is without streaks or crests on the head; its length is about sixteen inches. It breeds in large numbers on islands in Cook Strait and Bass's Strait, and appears to take great pains in constructing paths and avenues through the breeding grounds, carefully removing all sticks, stones, and herbage. The other species (*E. albosignata*) is similar but slightly larger and has both outer and inner instead of only the inner margins of the "flipper" margined with white; it is confined to the coasts of New Zealand.

The remaining genus (*Spheniscus*) embraces four species, and may be known by the rather long, stout bill, the basal portion of which is furrowed by many longitudinal ridges; there is also a well-developed white eyebrow stripe. Of these the Cape Penguin (*S. demersus*) occurs on the coasts of South Africa, and the others about the coasts of South America, the Galapagos and Falkland Islands.

CHAPTER XVI

THE LOONS AND GREBES

(Order *Colymbiformes*)

LTHOUGH placed next to the Penguins, the members of the present order are of course quite markedly different from them, but, as suggested in the chapter on classification, this disposition illustrates one of the difficulties of a linear arrangement, and it does not follow that all placed contiguously are equally related. However, the *Colymbiformes* are also a group of ancient origin and likewise hold a somewhat isolated position. They were formerly associated with the Auks, and as a matter of fact they not only show affinities with them, but with several other groups, yet comparatively recent anatomical studies have demonstrated that they are, on the whole, abundantly distinct and well entitled to be ranked as a separate order. They are all markedly aquatic birds of medium or large size, with moderately long necks, long, mostly sharp-pointed bills, usually strong wings, and webbed or lobed toes. Perhaps the most marked anatomical features are the laterally flattened metatarsi, and the peculiar upward prolongation of the cnemial crest of the tibia.

The *Colymbiformes* are divided into two families, the *Gavidæ*, or Loons, and the *Podicipedidæ*, or Grebes. The first is distinguished by having the hind toe on a level with the other toes, which are united by a web, and by a tail of eighteen or twenty short, stiff feathers. In the Grebes the hind toe is raised above the level of the others, while the toes are provided with wide lateral lobes, and the tail usually so reduced as to be indistinguishable, though, as Pycraft has recently shown, it is never really absent.

THE LOONS, OR DIVERS

(Family *Gavidæ*)

As a family the Loons are relatively very old, two or more fossil representatives having been discovered in the lower Miocene of France and the Pliocene of England, but so far as we are able to determine they did not differ essentially from the modern representatives, showing that the latter have changed but little with time. They are birds of large size, ranging between twenty-four and thirty-eight inches in length, and are past masters in the art of swimming and diving. They present a very awkward appearance on land, since the legs are placed

far back on the body, but the water is their natural element, and they are perhaps the most expert divers known among birds, diving so quickly that it is almost impossible to shoot one, when it is alert, even with a rifle. Although they have well-developed and rather strong wings, they rise from the water with more or less difficulty, but when once under way their flight is exceedingly swift and as straight as an arrow. The sexes are alike in plumage, although there is considerable difference between the summer and winter dress as well as between adults and downy young. They are blackish or slaty above and white beneath, becoming in summer thickly spotted or speckled with white, while the throat and fore neck are blackish or chestnut. In winter plumage and in the young the white markings are absent from the upper parts and the throat and fore neck are white like the remainder of the lower parts. They are circumpolar in distribution, the five recognized species being referred to a single genus (*Gavia*). Unlike their relatives the Auks, they are not at all gregarious or sociable, being usually found singly or in pairs, though occasionally in winter they are forced to crowd together when there is a limited surface of open water in which they can feed. They are found during the nesting season throughout the cooler parts of the northern hemisphere, even well within the Arctic circle, but during the winter they are widely spread throughout temperate regions, and especially along the adjacent oceans. Knowing that man is its mortal enemy, it is constantly on the watch. When it meets a passing boat it widens the distance by immediately sheering off, and prefers to escape pursuit by diving rather than flying, remaining under water so long and coming to the surface at so great a distance from its would-be captor, and in such unexpected places, that its pursuit is rendered tedious and often unavailing. In spring they repair to the more secluded lakes and ponds for the purpose of rearing their young. The nest is a rude affair of grass, moss, and often a little mud, placed on the ground at the edge of a marsh or lake, often on an abandoned muskrat "house," a bog, or other slight elevation in shallow water. There is no attempt at concealment, but the nest is usually so placed as to permit of uninterrupted vision in all directions, so that the moment danger threatens the parent slips silently into the water and is gone. The eggs are, however, adapted for concealment, being dark brown or olive, speckled or spotted with brown or blackish, thus harmonizing with the grass lining of the nest. The eggs, two in number, are elongate-ovate in shape and of large size. The cry of the Loon is exceedingly loud and melancholy, being likened by some to the howl of a wolf or the prolonged scream of a human being in deep distress. It is frequently uttered at night, or in early morning when nature is otherwise silent, and the effect upon the startled listener is often one of fright and horror. They feed entirely upon fish, which they are adepts in capturing. The following account is from the pen of Dr. Coues, and refers to the Pacific Loon (*Gavia pacifica*), which he once found surprisingly tame about the bay of San Pedro in southern California: "Now two or three would ride lightly over the surface, with neck gracefully curved, propelled with idle strokes of their paddles to this side and that, one leg, often the other, stretched at ease almost horizontally backward, while their flashing eyes, first directed upward

with sidelong glance, then peering into the depths below, sought for some attractive morsel. In an instant, with the peculiar motion, impossible to describe, they would disappear beneath the surface, leaving a little foam and bubbles to mark where they went down, and I could follow their course under water; see them shoot with marvelous swiftness through the liquid element, as, urged by the powerful strokes of the webbed feet and beats of the half-opened wings, they flew rather than swam; see them dart out the arrow-like bill, transfix an unlucky fish, and lightly rise to the surface again."

The characters upon which the species of Loon are based, although not very striking, are ordinarily sufficient for their ready identification. Thus the first four species to be mentioned agree in having the tarsus shorter than the middle

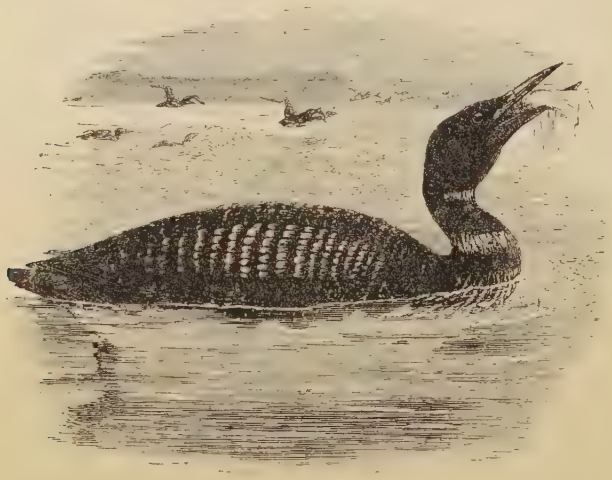


Fig. 31. — Common Loon, *Gavia imber*.

toe without the claw, and in having the fore neck blackish in summer. In the so-called Common Loon (*G. imber*) the bill in the mature bird is blackish and the head and neck are glossed with velvety green; the length is from twenty-eight to thirty-six inches. This bird is found throughout the northern part of the Northern Hemisphere. Its closest relative is the Yellow-billed Loon (*G. adamsii*), so named from the fact that the bill is almost wholly yellowish white, while the head and neck are glossed with velvety violet-blue. It is also the largest species, ranging from thirty-five to thirty-eight inches in length, and inhabits western Arctic America and northeastern Asia. These two species have the head and neck black all around, while in the two following these parts are grayish. Of these the Black-throated Loon (*G. arctica*) is so called from the blackish fore neck, this being glossed with velvety purple. It is smaller than either of those above mentioned, being from twenty-six to twenty-nine inches long. It ranges over the northern portions of the Northern Hemisphere, breed-

ing in the Arctic regions. Very closely allied is the Pacific Loon (*G. pacifica*), being distinguished by its smaller size and the paler color of the nape and back of the head; it is confined to the Pacific coast of North America. In the remaining form, the Red-throated Loon (*G. lumme*), the tarsus is longer than the middle toe with its claw, and the fore neck is a rich chestnut. It is widely distributed over the northern portion of the Northern Hemisphere, nesting well within the Arctic regions.

THE GREBES

(Family *Podicipedidæ*)

As already stated the Grebes are much smaller birds than the Loons, few of them exceeding twenty inches in length, and many of them being under ten inches. By far the larger portion of their lives is spent in fresh water lakes and ponds, but in winter and during the migrations they often resort to the sea. Like their relatives they are most expert divers, taking to wing with great reluctance and only when so hard pressed that they would otherwise be captured. They readily dive at the flash of a gun and before shot or bullet can reach them. Unlike many other water birds they do not employ the wings in swimming under water, but depend exclusively on the lobed feet for both diving and swimming. Their food consists of frogs, fish, mollusks, water insects, and occasionally seeds and bits of vegetation. The nest is a thick, matted platform of rushes and other aquatic plants, often procured by the birds by diving, and is usually floating on the water, being perhaps slightly anchored, often over deep water, to some rush or other aquatic plant. The eggs, two to five in number, and dull white or greenish white in color, are placed in a slight depression on the top of the floating mass, and are always damp and not infrequently hatched while partially covered with water. "When out of the shell the young has not far to walk; he looks a few moments over the edge of his water-drenched cradle and down he goes with the expertness of an old diver." Ordinarily Grebes cannot be called gregarious, but frequently a few pairs build their nests close together. Thus Mr. Henshaw found upward of a dozen nests of the American Eared Grebe in a pond in southern Colorado, while Mr. Goss found fully a hundred pairs of the same species nesting in a little cove of Como Lake, Wyoming, and Mr. Seebohm records the finding of a dozen nests of the European Dabchick in an immense reed-bed near Danzig, Germany. After the full complement of eggs has been laid, the parent when leaving the nest, unless startled into leaving suddenly, carefully covers the eggs up with weeds and moss, entirely concealing them. As they are otherwise left exposed it is thought by Mr. Seebohm that the object is not so much for the purpose of hiding them as to protect them against cold; other authorities, however, are strongly of the opinion that it is done purely for purposes of concealment against egg-eating birds, such as Gulls, which would undoubtedly be quick to observe the uncovered eggs. During the breeding season Grebes have a variety of loud "braying" notes, but at other times they

are usually silent, and they have the singular habit, when not compelled to dive quickly, of sinking down gradually and backward into the water until they disappear entirely, not leaving a ripple on the surface. They are also able to swim for an indefinite time with only the bill out of water, and the seemingly mysterious disappearance is often to be accounted for in this manner.

Dabchicks. — The Grebes are practically cosmopolitan in distribution. Of the twenty-five or thirty forms recognized, North America lays claim to six, South America to nine, Europe to five, etc. There is some difference of opinion as to the number of genera that should be recognized, but according to recent authority it is perhaps advisable to recognize seven, of which *Podicipes* with fifteen species is the largest. Of these one of the best known is the Little Grebe, or Dabchick (*P. fluviatilis*) of central and southern Europe, whence it ranges westward into central Asia and even reaches Japan. It is only about nine and one half inches long and has the head, neck, and upper parts dark brown, the chin black, the cheek, throat, and sides of the neck reddish chestnut, and the under parts grayish white, while the bill is horn-color and the legs and feet dull green. It is a common and well-known bird throughout the British Islands, frequenting in summer the lakes and ponds, but in winter resorting to the rivers and larger bodies of water, and in very severe weather to the seacoast. It begins to breed toward the end of April or early in May, making the usual floating nest among the reeds. "The Dabchick," says Mr. Hudson, "has the curious habit of holding its young under its wing and diving from the nest, to take them out of danger." Two broods are frequently reared in a season, one bird caring for the numbers of the first brood while the other parent is incubating the second set of eggs. There are three or four species closely allied to the above, one of which (*P. philippinensis*) ranges from southern China through Formosa and the Burmese Provinces to the Philippine Islands and Borneo, another (*P. capensis*) from tropical Africa and Madagascar to Persia and the Indian peninsula, while the third (*P. tricolor*) is found from Borneo to Celebes and New Guinea. Still another is a peculiar whitish species (*P. albescens*) of Native Sikhim, North India, which is only seven and one half inches long. Other species are *P. pelzelni* of Madagascar, *P. novæ-hollandiæ* of Java, New Guinea, and Australia, *P. poliocephalus* of Australia and Tasmania, and *P. dominicus*, the St. Domingo Grebe of tropical America in general, but ranging north to southern Texas and southern California. This species is about nine inches long, dusky brown above, with head and neck dark grayish or lead-colored, the throat and chin dull black and the under parts white, while the bill is deep black, paler at the tip, the iris orange, and the legs and feet blackish. It frequents fresh-water ponds and lakelets as well as salt-water marshes. Another New Zealand species, also known as the Dabchick or Totokipo (*P. rufipectus*), is blackish brown above, finely streaked with white on the head, the throat brown, the breast rufous, and the abdomen white. Like the other members of the group, it dives with amazing agility; but according to Buller, it flies with difficulty, and only for a short distance, skimming the surface with a very labored flapping of its little wings. The five remaining species of the genus are all South American.

Horned and Eared Grebes. — The genus *Dytes*, as recognized by American ornithologists, contains three or four forms in which the bill is much shorter than the head and the wings barely more than six inches in length. Of these the Horned Grebe (*D. auritus*) is best known, being found throughout the northern portion of the Northern Hemisphere, breeding in the New World mainly north of the United States, and in winter ranging over most of the United States, as well as Europe, Japan, and China. It is between thirteen and fifteen inches long and has the back and wings blackish, with the lower neck and chest rufous, and the sides of the occiput with a very full dense tuft of soft, ochraceous plumes, whence its common name. It is found mainly in the interior, although frequently visiting the seacoast in winter; Thompson reports it as abundant in Manitoba. The Eared Grebe (*D. nigricollis*), which has a relatively wider bill than the last, is found throughout central Europe and Asia, and may be known by the head, neck, and chest being black instead of rufous and by the crest being more tuft-like or fan-shaped. Closely allied, but having the inner quills with the inner web wholly dusky instead of white, is the American Eared Grebe (*D. nigricollis californicus*) of western North America.

Fig. 32. — Horned Grebe, *Dytes auritus*.

Peruvian Flightless Grebe. — Lake Titicaca, in southern Peru, is the exclusive home of a curious flightless Grebe (*Centropelma micropterum*). The general color above is dark brown mixed with chestnut on the sides of the lower back and rump, the crown and occiput as well as the sides of the neck being rich chestnut, while the chin, throat, and fore neck are white and the under parts dull rufous tinged with satiny white; the length is about sixteen inches. According to Professor Garman, these birds are very common about all parts of the lake where the water is at all shallow, feeding on fishes and batrachians. "They are unable to rise from the water, but by flapping their rudimentary wings and striking the water with their feet, they manage to progress quite rapidly for a short distance. They dive quickly at the discharge of a gun — so quickly that unless taken unawares will dodge the shot — and escape, often swimming a long distance under water before reappearing."

Great Crested Grebe. — With the bill about as long as the head, and the wing

more than six inches in length, are the three species of the genus *Lophæthyia*, one of which, the Great Crested Grebe (*L. cristata*), is of nearly cosmopolitan distribution, ranging from Europe and northern Asia to Africa, Australia, and New Zealand. It is the largest member of the group, being from twenty-two to twenty-four inches long, and during the breeding season at least is ornamented with a very prominent black-tipped frill, as well as by a pair of long, glossy black tufts or "horns" on the top of the head. The upper parts are dark brown and the under parts silky white quite to the bases of the feathers. "Among our large water birds," says Hudson, "there are few more strikingly handsome than this Grebe in its full breeding plumage, when viewed as it floats, unalarmed, in the secluded reed-fringed water it loves." Much smaller than this, and confined to the northern parts of the Eastern Hemisphere, is the Red-necked Grebe (*L. griseigena*), while the third species, known as Holbœll's Grebe (*L. holbœllii*), is found in North America, including Greenland and eastern Asia, breeding usually far northward. It is about nineteen inches long, blackish above, glossy on the top of the head and back of the neck, rufous on the front and sides of the neck, and silvery white on the throat, sides of the head, and under parts.

Pied-billed Grebe. — Passing over the genus *Æchmophorus*, which embraces a single New World form, we come to the final genus, which contains only the Pied-billed Grebe, Helldiver, or Water-witch (*Podilymbus podiceps*), as it is variously called. It is distinguished from the others by the very stout bill, in which the length is less than twice the depth at the base. About fourteen inches long, it is brownish above and silvery white beneath, becoming in the breeding season black on chin and throat, and spotted with dusky below, while the bill is whitish, crossed near the middle by a black band. During winter the black on the throat is replaced by dull white, the lower parts are without the dusky spots, and the bill without the black band. This bird, probably the commonest and best known of our Grebes, is found throughout the whole of North and South America except in the extreme northern and southern districts. Its various common names are a sufficient indication of its most salient characteristics.

CHAPTER XVII

THE ALBATROSSES AND PETRELS

(Order *Procellariiformes*)

OF the very few large groups of birds that may be diagnosed by a single character, the present forms a notable example, since all of its members agree in possessing tubular external nostrils, whence they are often and appropriately called the Tubinares, or Tube-nosed Swimmers. In addition to this character it may be pointed out that they are all strong flying birds of the ocean, possessing long, narrow wings, and fully webbed front toes, while the first or hind toe is absent or reduced to a mere rudiment.

Although there are some differences of opinion as to the affinities of this group, it seems beyond question that they are most closely related to the *Steganopodes*, and are conveniently and quite naturally divided into three families, the first of which includes the Albatrosses (*Diomedeidæ*).

THE ALBATROSSES

(Family *Diomedeidæ*)

To those who "go down to the sea in ships" one of the marvels is the wonderful power of flight enjoyed by the Albatrosses. On tireless wing, hour after hour, day after day, they "wheel round and round, and forever round the ship — now far behind, now sweeping past in a long rapid survey like a perfect skater on an uneven field of ice. There is no effort; watch as closely as you will, you rarely or never see a stroke of the mighty pinion. The flight is generally near the water, often close to it. You lose sight of the bird as he disappears in the hollow between the waves, and catch him again as he rises over the crest; but how he rises and whence comes the propelling force is to the eye inexplicable; he merely alters the angle at which the wings are inclined; usually they are parallel to the water and horizontal; but when he turns to ascend or makes a change in his direction, the wings then point at an angle, one to the sky, the other to the water." — BULLER.

While many ingenious theories have been propounded to account for the amazing power which these birds possess of sailing in the air for perhaps an hour at a time without the slightest apparent motion of the expanded wings, we are still without a wholly satisfactory explanation. "The Albatross has," says

Mr. Lucas, "that type of wing which best fulfils the conditions necessary for an aëroplane, being long and narrow, so that while a full-grown Albatross may spread from ten to twelve feet from tip to tip, this wing is not more than nine inches wide. This spread of wing is gained by the elongation of the inner bones of the wing and by increasing the number of secondaries, there being about forty of these feathers in the wing of the Albatross."

The Albatrosses, of which some sixteen or eighteen species are known, are mainly birds of the southern tropical or subtropical seas, although two species are found in the North Pacific as far north as Alaska, and two other species are occasionally found on the Pacific coast of the United States; on the Atlantic side it is rare indeed to find them as far north as Tampa Bay. They are invariably met with by ships that round Cape Horn or the Cape of Good Hope, and many a time has their presence "aroused the tired sailor's admiration by the power and endurance of their scarcely moving wings, which seem never to know or need a rest." The Albatrosses are among the largest of the water birds in existence, at least of those enjoying the power of flight. The spread of wings, as already stated, may reach ten or twelve feet, yet the weight of the entire body of even the largest birds rarely exceeds sixteen or eighteen pounds. The food of the Albatrosses consists of fish, cuttlefish, jellyfish, offal, and scraps thrown overboard from passing ships. This latter habit of feeding frequently results in their extinction, for by baiting a hook attached to a long line with some tempting bit of meat they are easily caught and drawn on board. This practice has been so often resorted to that, coupled with the frequent destruction of the nests, certain species have been greatly reduced in numbers and seem on the verge of extermination.

At the nesting time the Albatrosses resort in great numbers to various isolated oceanic islands, where they build on the ground in open situations a mound-like nest of mud and grasses some eighteen inches or more high. In a slight depression in the top the single egg is laid. The egg is very large, even for the size of the bird, in the case of the Wandering Albatross being about five inches in length and over three inches in diameter. It is coarse in texture, of an elongated oval form, with the smaller end compressed and often enlarged at the tip; in color the eggs vary from dull white to pale yellow, usually profusely marked at the larger end with reddish brown specks and dots. The birds while incubating the egg sit very closely, allowing a near approach without making the least movement. On this point Kidder says: "They are dull birds, making but little attempt to defend their eggs beyond loudly clattering their bills. The sound thus produced is louder than would be expected, owing to the resonance of the considerable cavity included by the mandibles. It is very like the sound of a tin pan beaten with a stick. I knocked several off and secured their eggs before they recovered sufficiently to approach the nests. They climbed on to the empty nests, however, and sat as contentedly, to all appearances, as before. I believe they do not lay a second time; the whalers, who are very fond of the eggs, assert that they never find a second one in a nest that has been once robbed."

Many curious stories have been told regarding the treatment of the young.

FIG. 32 a. — Laysan Albatross, *Diomedea immutabilis*. (Courtesy U. S. Department of Agriculture.)

Thus it is the popular belief among the whalers that after the young are hatched in January the old birds leave at once and do not return until the following October, the young birds feeding, in the meantime, on their own fat! Against the idea of the young birds feeding at night it is urged that they cannot fly during this period. These statements are, of course, incredible, and it is probable that they are fed at night by the parents, who may be absent during the daytime.

Laysan Albatross. — Mr. Walter K. Fisher has recently given a very complete account of the Laysan Albatross (*D. immutabilis*), from which we select the description of a curious dance or "cake-walk" that is constantly being executed by the old birds. "At first two birds approach one another, bowing profoundly and stepping heavily. They swagger about each other, nodding and courtesying solemnly, then suddenly begin to fence a little, crossing bills and whetting them together, sometimes with a whistling sound, meantime pecking and dropping stiff little bows. All at once one lifts its closed wing and nibbles at the feathers beneath, or rarely, if in a hurry, quickly turns its head. The partner during this short performance assumes a statuesque pose, and either moves mechanically from side to side, or snaps its bill loudly a few times. Then the first bird bows once, and pointing its head and beak straight upward, rises on its toes, puffs out its breast, and utters a prolonged, nasal *Ah-h-h-h*, with a rapidly rising inflection. While this 'song' is being uttered, the companion loudly and rapidly snaps its bill. Often both birds raise their heads in air and either one or both favor the appreciative audience with the ridiculous and indescribable bovine groan. When they have finished they begin bowing to each other again, rapidly and alternately, and presently repeat the performance, the birds reversing their rôle in the game or not."

Wandering Albatross and Relatives. — The Albatrosses were formerly included in a single genus, but later authorities mainly agree in separating them into three genera, of which *Diomedea* is the original and largest, and may be known by the upper division of the bill being broadest at the base. Of the ten recognized species in this genus the Wandering Albatross (*D. exulans*) is by far the commonest and best known, being widely spread over the southern oceans. The fully adult birds are white, with the back banded with narrow, transverse, undulating dark lines, while the wing-quills are black. In the young the general color is dusky, with the head whitish. The bill is yellowish horn-color, becoming orange at the base, and the feet and legs flesh-color. According to Ridgway the length is from forty-four to fifty-five inches, and the spread of wings from one hundred and twenty-five to one hundred and thirty inches. Very similar to this species is the Royal Albatross (*D. regia*) of the New Zealand seas, which differs mainly in the absence of the transverse dark lines on the upper back and of spots on the tail, and the White-winged Albatross (*D. chionoptera*) of the southern Indian Ocean, which is almost pure white throughout. Of the two species inhabiting the North Pacific, the Short-tailed Albatross (*D. albatrus*) is white, becoming straw-yellow on the head and neck, and has the bill and feet pale brownish, while the Black-footed Albatross (*D. nigripes*) is a uniform dusky, with the bill purplish brown and the feet black; neither is more than thirty-

seven inches in length. Of the remaining species we may only mention the Spectacled Albatross (*D. melanophrys*), which is so called from the presence of a distinct grayish stripe on the sides of the head and about the eyes. It is a small species, being only about thirty inches long, and is found in the southern oceans, straying occasionally to the coast of California. A single fossil species has been described from the recent deposits of England.

The second genus (*Thalassogeron*), which is perhaps doubtfully distinct, is distinguished by the fact that the upper division of the bill is narrow, and of equal width from the middle of the culmen to the base. The six species are, with one exception, confined to the Southern Ocean, the exception being the Albatross (*T. eximius*) of Gough Island in the South Atlantic. The only species casually reaching the Pacific coast of South America is the Yellow-nosed Albatross (*T. culminatus*), a bird about thirty-six inches long, of a uniform dark brownish slate above, with the rump, upper tail-coverts, and lower parts white. The peculiar common name arises from the presence of a yellowish stripe along the edge of the lower mandible.

The **Sooty Albatross** (*Phœbetria fuliginosa*) is the sole representative of the remaining genus and is distinguished at once from all the others by the presence of a distinct longitudinal groove on the sides of the lower mandible, which extends the entire length of the lateral division, and by its wedge-shaped tail. In the adult the plumage of the neck, back, and lower parts is pale smoky gray, becoming deep sooty on the sides of the head, chin, and throat, while the bill is deep black with the grooves whitish and the feet pale reddish. Its home is in the southern seas, though coming occasionally as far north as the coast of Oregon.

THE PETRELS

(Family *Procellariidæ*)

The Petrels take their name from the fact that they often appear to walk on the surface of the water, as the Apostle Peter is said to have done, the word being derived from the Latin *petrellus*, meaning literally "little Peter." They of course do not actually walk on the water, but the bodies of some species are so small and light that they are able, with only the slightest seeming exertion, to keep the moving feet just touching the water, and then they may seem to be walking on its surface.

The Petrels constitute a large, well-marked group of birds embracing upward of twenty genera and one hundred species, of which number more than thirty have been found in North America. They are strictly birds of the ocean, never venturing near the land except at the breeding season, and even then they seem in haste to be gone. "None of the Petrels," says Professor Newton, "are endowed with any brilliant coloring — sooty black, gray of various tints (one of which approaches to and is often called "blue"), and white being the only hues

their plumage exhibits; but their graceful flight, and their companionship where no other life is visible around a lonely vessel on the wildest oceans, gives them an interest to beholders." In distribution the Petrels are found throughout all seas and oceans of the world, but they are most abundant both in kinds and individuals in the Southern Ocean.

Their powers of flight are almost if not quite equal to those of the Albatrosses, as they are known to follow a vessel for days at a time, apparently not needing or caring for rest. However, they all swim readily and it is probable that indi-

FIG. 33. — Galapagos Stormy Petrel, *Procellaria tethys*. Dark-rumped Petrel, *Æstrelata phæopygia*.

viduals really rest for a few minutes in the water and then easily overtake the ship without their absence having been noticed. In the manner of nesting, the Petrels differ quite markedly from the Albatrosses, as they nest in holes among rocks usually on the face of a cliff, occasionally in holes made by burrowing animals of various kinds, or among tufts of grass or other plants, while not a few of the species excavate holes or burrows for themselves in the ground; rarely the egg is placed on the bare rock without the pretense of a nest. These burrows

are of considerable length and frequently turn and double on themselves, and when available nesting sites are limited, or the ground is especially hard in which it is necessary to dig, it appears that several birds may combine forces. Thus on the Bird Rocks in the Gulf of St. Lawrence, Palmer speaks of having found four females and five eggs of Leach's Petrel in a single hole, but ordinarily there is only one occupant. The Petrels lay but a single egg, which is white, frequently tinged, when perfectly fresh, with very pale blue. The eggs of many species are entirely unmarked, while those of others are more or less spotted with rufous on the large end. They usually sit closely when incubating the egg and are removed from it or their burrow with difficulty, not to say danger. Of this peculiarity in Rodgers's Fulmar of the Pribilof Islands, Elliott says: "It is of all the water fowl the most devoted to its charge, for it will not be scared from the egg by any demonstration that may be made in the way of throwing or yelling, and it will even die as it sits rather than take flight, as I have frequently witnessed." Kidder also graphically describes the actions of various burrowing species as observed by him on Kerguelen Island. The dog belonging to their party habitually dug them out of their holes for food, and they "were generally brought to the surface hanging to his ear." Petrels are mainly nocturnal in their habits, at least during the nesting season, and their presence may be entirely unsuspected in the daytime. To quote again from Kidder regarding the Whalebird (*Prion desolatus*): "Upon first landing, the hillsides, apparently deserted during the day, became at night perfectly alive with these birds, flying irregularly about the rocks and hummocks of *Azorella*, and filling the air with their calls." Their crepuscular habits, combined with the fact that they usually seek isolated places for nesting, make their study difficult, and we are still in ignorance of the nests and eggs of several species.

The food of the Petrels is also more or less in doubt. The stomachs of those examined appear to contain oil, but whether this is the usual food is not known, and it seems more than probable that the minute animals so abundant in tropical waters supply a considerable share.

As already stated, the Petrels never voluntarily visit the land except for nesting purposes, but they are frequently driven out of their course and often far inland during severe storms. A remarkable case of this kind was recorded some years ago, when, during a violent storm of several days' duration, two specimens of the Sandwich Island Petrel, a bird found normally in the vicinity of the Hawaiian Islands, the Galapagos Archipelago, and Canary Islands, were secured in an exhausted condition in the city of Washington. A single specimen had previously been found dead on the shore of England, and one or two are recorded from Scandinavia. In their natural wanderings these birds may have passed around Cape Horn and up into the North Atlantic, where it is now known a colony of them has been established in the Madeiras, as specimens have recently been received from there, and as a matter of fact it may be added the species was first made known from the Canaries. The specimens taken in Washington were the first ever noted in North America, though very recently an example has been captured in Indiana. The Black-capped Petrel, whose home is around

Guadeloupe Island, in the Lesser Antilles, has been captured, probably just after a tropical hurricane, in Virginia, over 200 miles from the sea, in New York State, and also in Hungary. That the Petrels, strong flying as they are, are frequently destroyed during storms, is well shown by Buller in his "Birds of New Zealand." He says regarding the little Dove Petrel: "This charming little Petrel is extremely abundant off our coasts, and I have often observed flocks of them on the wing together numbering many hundreds. In boisterous weather it appears to suffer more than any other ocean species from the fury of the tempest, and the sea beach is sometimes found literally strewn with the bodies of the dead and dying. I have frequently watched them battling, as it were, with the storm,

Fig. 34. — Giant Fulmar, *Macronectes gigantea.*

till at length, unable longer to keep to windward, they have been mercilessly blown down upon the sands, and, being unable from sheer exhaustion to rise on the wing again, have been beaten to death by the rolling surf or pounced upon and devoured by a hovering Sea-Gull."

Fulmars. — The present family is often divided into a number of more or less well marked subfamilies, the first of which (the *Fulmarinæ*) embraces the Fulmars and their immediate allies, and of which the Giant Fulmar, or Cape Hen (*Macronectes gigantea*), may be taken as the type. This species, the sole representative of its genus, is but little inferior to the Albatrosses, being from thirty to thirty-six inches in length, and having a spread of wings from seventy-two to eighty-four inches. It is distinguished at once by its great size, by the very long and stout nasal tubes, and tail of sixteen feathers. There are two well-marked phases of plumage, a so-called light phase, in which the head, neck, and lower parts are

white, the upper parts dusky, and the bill light yellowish, and a dark phase, in which the plumage is a uniform dark sooty brown, with the bill olive yellowish or grayish white; the legs and feet are grayish black. This species is widely distributed throughout the southern seas, occasionally wandering north on the Pacific coast of America as far as Oregon, as its power of flight is nearly if not quite equal to that of the Albatrosses. It is known to the whalers as the "Nelly," "Breakbones," or "Stinker," the latter name from its habit of vomiting the foul contents of its stomach, often to a distance of several feet, when approached or wounded. It nests in the same places as the Albatrosses, laying a single large dirty white egg on the bare ground. Its food consists largely when procurable of the blubber and flesh of the seals, sea-elephants, and whales, that are killed for commercial purposes, and, when occasion presents, of the bodies of its feathered relatives. Kidder found them abundant on Kerguelen Island, feeding on the carcass of the sea-elephant. "With their huge whitish beaks, light-colored heads (then covered with clotted blood), and disordered dun plumage, they reminded me strongly of Vultures. Like Vultures, also, they had so crammed themselves that they were unable to rise from the ground. They waddled and stumbled to the sea, swam away, and did not rise into the air until half an hour or more of digestion, and perhaps of vomiting, had made it possible." They were also observed eating carrion, and were altogether the filthiest birds on the island.

The Fulmar Petrels (*Fulmarus*), of which there are some four or five forms, take the place in the Northern Hemisphere that the Giant Fulmar fills in the southern seas. They are similar to their great relative, but are distinguished at once by their smaller size, none of them exceeding twenty inches in length, by having the bill shorter instead of longer than the tarsus, by the relatively shorter and smaller nasal tubes, and a tail of only fourteen feathers. In the Common Fulmar (*F. glacialis*) of the North Atlantic, the nasal tubes are distinctly dusky and the whole bill sometimes brownish, while in the remaining forms, which are confined mainly to the North Pacific, these tubes are light-colored, and the bill never dark. In plumage they also exhibit a light and dark phase, in the first having the head, neck, and lower parts white and the upper parts bluish gray, while in the second the plumage is entirely smoky gray. The typical form (*F. glacialis*) is a very abundant bird throughout the Arctic and the sub-Arctic seas, often following the ships until they enter the pack ice. It possesses great powers of flight, is very graceful on the wing, and is usually seen in the air or rarely sitting on the water. It is not especially gregarious except at the nesting season, but when a supply of food is encountered many thousands may congregate. It is very partial to the fat of the whale, and when one of these huge animals has been killed the Fulmars approach for their share, and not infrequently gorge themselves to such an extent as to be unable to fly. They are ordinarily very tame and approach so closely as to be readily knocked over with a boat-hook or even taken in the hand, and they also take a baited hook freely, returning at once when liberated to be captured a second time. When taken in the hand they vomit a considerable quantity of clear, amber-colored oil, which possesses a peculiar

and very disagreeable odor. During the breeding season they nest in vast communities on rocks and cliffs, making but little attempt at a nest, indeed often laying the single large egg on the bare ground. The eggs are much esteemed for food, being regarded as even superior to those of the domestic Duck, and consequently the birds are frequently robbed. The Fulmars are particularly tame at this season, permitting themselves to be taken in the hand or knocked from the nest with a cane.

Of the Pacific forms Rodgers's Fulmar (*F. rodgersii*), of which brief mention has already been made, is confined to Bering Sea and adjacent waters, while the Pacific Fulmar (*F. g. glupischa*) ranges from the North Pacific south along the American coast to Mexico. Anthony has given us a very entertaining account of the Fulmars of southern California, especially as they congregate on the fishing banks some miles off the coast. The birds settle down within a few yards of the fishermen and when the line is hauled up after a successful sound they become greatly excited as the fish come into sight through the limpid water. It usually happens that one or more fish are detached and float to windward, only to be pounced upon and torn to pieces by the hungry Fulmars. "Their confidence in mankind is at all times very great. I have several times seen them killed by fishermen, who had but to drop a small piece of fish overboard and hit the bird with a club when it swam up to get it." They were also taken by the hand and "when thrown upon the deck made no attempt to fly, but with outstretched wings hurried to the rail, over which they could just reach, and emptied the contents of their stomachs into the sea. Their actions were so like those of a seasick landsman that it was extremely laughable."

Cape Petrel. —The little Pintado, Cape Petrel (*Daption capensis*), or Cape Pigeon as it is perhaps most frequently called, from its superficial resemblance to a Pigeon, is by many placed next the Fulmars. It is much smaller than any of these, being only fifteen or sixteen inches in length, and has the head black, the back white, spotted with black, while the under parts are immaculate white. It is a native of the southern seas generally, coming north to Ceylon and occasionally, perhaps only accidentally, to California, on the Pacific coast of America. To all voyagers in southern seas it is an abundant and familiar bird, coming about the ship often in great numbers and feeding greedily on the scraps thrown overboard. It is said to dive readily, dropping suddenly into the water, and instantly disappearing, and it will also fish up bits of food from a slight depth of water. Like others of its kind, it ejects an offensive fluid when caught. Their breeding places are various Antarctic islands.

Dove Petrels. —The final members of this subfamily are the little Dove Petrels (*Prion*), of which some four species are recognized; all are inhabitants of the southern oceans. About twelve inches long, the upper surface is ashy blue, darker on the head and under the eye, and white below, while there is a very distinct black V-shaped band running from the wrist-joint along the radial portion of the wing to and across the rump, which is very conspicuous when the bird is flying. The several species are mainly distinguished by the width of the bill. The common Dove Petrel (*P. desolatus*) is perhaps the best known, being

not uncommon in the South Atlantic and Antarctic seas. They fly in small flocks, and Kidder notes that they use first one wing and then the other, producing a peculiar irregularity of flight, that leads them to be often mistaken for shore-birds. They are rather wary, not feeding on the scraps from a ship, but attending the whales to feed on what drops from their mouths, whence they are often called Whale-birds by the sailors and others. They breed on Kerguelen Island, making their burrows near the seashore, in lowland, under stones, or in the stony ground, and are strictly nocturnal in their habits.

Shearwaters. — A large and somewhat varied group of birds known as Shearwaters comprises principally the second subfamily (*Puffininæ*), deriving their popular name from their habit of gliding along very close to the surface of the water, and their scientific designation from the mistaken notion that they were Puffins. They are strong-flying Petrels, with long, slender bills in which the nasal tubes are united externally, or nearly so, above the culmen, and with long, pointed wings. They are found on practically all of the seas of the world, though ordinarily at no great distance from land, to which, however, they rarely resort except for nesting purposes. Some twenty-five species have been described, of which number North America lays claim to ten or more; but as the differences between the species are not very strongly marked and the habits very similar, it will only be necessary to select a few of the more important. One of the largest species is the Great Shearwater or Hagdon (*P. major*) of the Atlantic Ocean generally, a bird nineteen or twenty inches long, having the upper parts fuscous, with the wings and tail slightly darker, while the under parts are white, becoming ashy gray on the abdomen and under tail-coverts. It is exceedingly abundant in many parts of the Atlantic, especially off the coast of Newfoundland, where Palmer speaks of seeing them in thousands sitting on the water. Brewster says of its flight: "It usually follows a direct course, and invariably skims close over the waves. I know of no other sea-bird whose movements are so easy and graceful. Indeed, at times, especially during a gale, its evolutions will compare in grace and spirit with those of the Mississippi or Swallow-tailed Kites." Its nest and eggs are unknown. Of the four species found in the British seas the Manx Shearwater (*P. puffinus*) is the most abundant and best known. It is much smaller than the last, being only about fifteen inches long, and is sooty black above and white below, with the sides of the neck mottled with grayish brown. It breeds at several stations in the Channel and along the west coast of Great Britain, as well as a few islands of the Irish coast, but the principal colony is on St. Kilda, often called the sea-birds' paradise. Its favorite breeding places are the islands with a good ocean aspect, especially such as are broken in grassy downs, and fall in crags and precipices more or less turf-grown. Their burrows are made in the steep, grassy parts of the cliff or near their summit, and many nests are made close together, sometimes one main entrance leading to several burrows, each containing a nest. The birds are strictly nocturnal during the nesting season, but in winter they are said to feed at all hours. Other species of more or less common occurrence in the Atlantic are Audubon's Shearwater (*P. lherminieri*) and the Sooty Shearwater, or Black Hagdon (*P. fuliginosus*),

both very dark or sooty above. On the Pacific coast of the United States there are a number of species, perhaps the most abundant being the Black vented Shearwater (*P. opisthomelas*) of southern California. About fourteen or fifteen inches long, it has the upper parts a uniform sooty slate, paler on the head and neck, and the under tail-coverts wholly sooty grayish. According to Mr. A. W. Anthony, it is extremely abundant off the coast of central California in summer, and is found at all seasons of the year south of the Santa Barbara Islands. It has been found breeding on San Benito Islands, all the nests being in small caves, and on Natividad Island, an island some thirty five miles south, where they excavate burrows often ten feet in length. Other well known species are the Dark-bodied Shearwater (*P. griseus*), Townsend's Shearwater (*P. auricularis*) of Clarion Island and western Mexico, and the Wedge tailed Shearwater (*P. cuneatus*), a species supposed previously to range from the Hawaiian Islands to the Bonin Islands, south of Japan, but which Mr. Anthony has found to be abundant off Lower California in May and June. Another species of wide range is the Slender-billed Shearwater (*P. tenuirostris*) which ranges from the seas about Australia and New Zealand to Alaska and Japan. It is very abundant about New Zealand and retires inland, sometimes for fifty miles, to breed.

Black-capped Petrel. — Passing over several smaller genera, we come to another large genus of Petrels (*Æstrelata*), the members of which are rather closely allied to the Shearwaters, but from which they differ in having a shorter and stouter bill, a very thin partition between the nostrils, relatively shorter nasal tubes, and a very large "nail," which occupies at least one third the total length of the lower mandible. The plumage and size in the thirty or more species is very variable. They are natives mainly of the temperate and tropical portions of the oceans of the Southern Hemisphere, coming northward in the Atlantic casually to the British Islands and the Middle Atlantic States, and in the Pacific to Alaska and Japan. One of the North American species is the Black-capped Petrel (*Æ. hasitata*), a bird about fifteen inches in length, sooty brown above, with the crown black and the back of the neck, upper tail coverts, and whole under surface pure white. It ranges from the West Indies to Florida and Long Island, but almost nothing is known of its history or habits. Another species, known as the Dark-rumped Petrel (*Æ. phæopygia*), occurs in the middle Pacific, from the Hawaiian Islands to the Galapagos. Perhaps the handsomest as well as the rarest species is Fisher's Petrel (*Æ. fisheri*) of the North Pacific in the vicinity of Kadiak, Alaska. It is uniform bluish gray above, the top of the head white, spotted with grayish, while the cheeks, chin, throat, middle of the chest, and under tail-coverts are pure white, and the lower breast, abdomen, and flanks smoky lead-colored superficially, but with the feathers all pure white immediately beneath the surface. It is only known from the type specimen.

Bulwer's Petrel. — The final member of this subfamily to be noticed is Bulwer's Petrel (*Bulweria bulweri*) of the temperate North Atlantic and Pacific oceans, which differs from the last by its longer, more graduated tail, less compressed bill, and smaller feet. It is only ten inches long and in color is uniform fuliginous dusky, lighter and more grayish brown beneath, while the wings are

blackish. It breeds in the Canaries and Madeira, nesting in holes in rocks near the foot of the cliffs. Its cry is said to resemble that of a puppy.

Stormy Petrels. — Perhaps the most interesting of all the Petrels, or at least those about which there clusters the most of poetry and superstition, are the little Stormy Petrels (*Procellaria*), which may be taken as the type of the subfamily *Procellariinæ*. They are known at once by their small size, their bodies being no larger than that of an English Sparrow, and their length not exceeding six inches. The general color of the plumage is a sooty blackish, somewhat paler or more sooty grayish below, set off by a conspicuously snow-white rump. They are preëminently birds of the ocean, never approaching the land except during the nesting season or when driven there by extraordinarily severe gales, and as they are perhaps most frequently seen just before or during a storm, attracted doubtless by the minute animals upon which they probably feed, then found at the surface of the sea, they have come to be regarded with superstition by sailors, and many a dire calamity has been predicted on their presence. Sailors call them "Mother Carey's Chickens"; "but not, as might be imagined from such a name, of any tender regard or feeling of affection for the birds. Mother Carey is supposed to be a kind of ocean witch, a supernatural Mother Shipton, who rides the blast, and who has for attendants and harbingers the little Dark-winged Petrels." But on the other hand, by exhibiting their wonderful power of endurance, they may stimulate to renewed exertion the weary, storm-tossed mariners. A well-known writer, after describing a tempestuous voyage, says, "It was some relief to the extreme monotony and misery of our situation, to watch the movements of these fairy-like beings as they danced among the surging billows, running with fluttering wings in the hollow of the waves, and hovering over their foaming crests with the lightness of summer butterflies." Of the two species the true Stormy Petrel (*P. pelagica*) is found in the North Atlantic, south to the Newfoundland Banks and the western coast of Africa. It is apparently only a transient visitor to American waters, perhaps not breeding, its principal nesting grounds being along the Atlantic coast of Europe, especially the Scilly Islands, the Orkneys, and Shetlands. It is gregarious during the nesting season, which does not begin until June, and places its single white, minutely speckled egg in rabbit or Puffin burrows, under a rock or heap of loose stones, or even in ruined walls. The bird is a close sitter, remaining in its burrows until dragged out, and when taken in the hand ejects a small quantity of strong-smelling, amber-colored oil from the mouth. The other species known as the Galapagos Stormy Petrel (*P. tethys*) is found in the vicinity of the islands of

Fig. 35. — Stormy Petrel, *Procellaria pelagica*.

that name and on the coast of South America. It is slightly larger and has the upper tail-coverts entirely white and the tail slightly emarginate instead of even or rounded.

Least Petrel. — Very closely related is the Least Petrel (*Halocyptena microsoma*), found along the Pacific coast from Lower California to Panama, the sole representative of its genus. It is only about five and three quarters inches long, and differs from the last mainly in possessing a rounded tail and in the absence of the white rump. It is a rare bird, and but little is known of its habits beyond the fact that it nests on San Benito, a small rocky island some fifty miles off the coast of the peninsula, placing its pearly white egg on the bare rock, in the crevices of rocky ledges, or among the loose stones.

Leach's Petrel. — Also closely allied are the numerous species of *Oceanodroma*, which differ mainly by their larger size, distinctly forked tails, and the tarsus shorter rather than longer than the middle toe and claw. Their range is chiefly in the seas of the Northern Hemisphere, coming southward more or less regularly to the coast of Peru and the island of St. Helena. Of the dozen or more forms, Leach's Petrel (*O. leucorhoa*) is one of the best known. It is uniform sooty, rather darker above, and belongs to that section of the genus characterized by a white rump patch; its length is eight inches. It is equally at home in the North Atlantic and North Pacific, its habits being very similar to those of the Stormy Petrel; in fact, it is the common "Mother Carey's Chicken" of the New England coast. It breeds abundantly on the Atlantic coast of North America from Casco Bay, Maine, to Greenland, at various points on the European coast, as well as the coast of Alaska in the Pacific. The nest is in a burrow, often several feet deep, made usually in peaty soil.

Wilson's Petrel. — A little larger than the Stormy Petrel, and often confused with it under the name of "Mother Carey's Chicken," is the Wilson's Petrel (*Oceanites oceanicus*), of the Atlantic and Indian oceans, typical of the subfamily *Oceanitinæ*, in which the leg bones are longer than the bones of the wing, the claws are very flat and broad, while the wing has ten, instead of at least thirteen, secondaries, as in the last subfamily. About seven inches in length, Wilson's Petrel is sooty black above, somewhat lighter below, while the longer upper tail-coverts are white and the wing-coverts grayish, margined with whitish. It breeds on various islands in the South Atlantic in the months of January and February, after which it is widely dispersed, becoming abundant, for example, in August, off the coast of North America from New Jersey to Newfoundland. Its nest is found in chinks and crevices among rocks, and the single egg is usually sprinkled and dotted with pink around one end. A second species known as the Graceful Petrel (*O. gracilis*) is found off the Pacific coast of South America, from Chile to the Galapagos Islands, and differs in having the tail distinctly forked, the abdomen white, and the webs of the feet dusky instead of yellowish.

Sea-nymph. — Closely allied is the pretty little Petrel known as the Sea-nymph (*Garrodia nereis*), which is found in the Southern Ocean from Kerguelen Island to New Zealand and the Falkland Islands, and is the only member of its genus. It is a little more than six and one half inches long, and has the head,

body, and tail bluish ashy, except the lower part of the breast and abdomen, which are white; the tail is very dark at the tip and appears fan-shaped in flight. Of their habits as observed on Kerguelen Island, Kidder says: "This Petrel is strictly crepuscular in habit when near its breeding place, none having been seen by daylight except when disturbed from the nest. The birds are at this season perfect balls of nearly fluid fat."

White-faced Petrel. — Another handsome bird is the White-faced Petrel (*Pelagodroma marina*), also of the southern seas. Its plumage is in general slate-color except the forehead, a stripe over the eye, and the lower parts, which are pure white. Its habits are similar to those of Leach's and the Stormy Petrel.

THE DIVING PETRELS

(Family *Pelecanoididæ*)

While the Albatrosses and Petrels thus far considered are probably all able to rest upon the water, very few of them are able or at least accustomed to dive beneath the surface. There are, however, a small number of Petrels inhabiting the southern seas that are especially known for their expert power of diving, whence they are appropriately called the Diving Petrels. In these birds the bill is shorter than the head, the nostrils distinct and opening upward on either side of the middle of the base of the culmen, while the wings are quite short and the first or hind toe wanting. The best-known species (*Pelecanoides urinatrix*), found in the Australian and New Zealand seas, as well as those about Cape Horn and the Falkland Islands, is about eight inches long, shining black above and white below, with the sides of the neck grayish. This species, according to Buller, is very common in the seas surrounding New Zealand, congregating in flocks often of large size and feeding on medusæ and other marine life. Its flight consists of a rapid fluttering movement along the surface of the water, and it dives through the waves with amazing agility. Another species called the Diver (*P. exsul*) is found in the Southern Ocean from the Crozette Islands to Kerguelen, where of its habits Dr. Kidder says: "On the first landing of our party at Kerguelen Island, this bird was one of the two most commonly heard at night and seen fluttering about the hillside. Its note is somewhat similar to the mew of a cat, with a marked rising inflection of sound. It cannot rise from level ground in flight, but, once in the air, flies strongly and rapidly, with a rapid fluttering motion of the wings, very like the flight of the common English Sparrow." Its single egg is placed in a burrow. The remaining species (*P. garnoti*) is found on the west coast of South America, and is distinguished principally by its greater size, being some nine and one half inches long.

CHAPTER XVIII

THE STORK-LIKE BIRDS

(Order *Ciconiiformes*)

THE general appropriateness of associating most of the birds of this order under the name of Stork-like birds will be appreciated at a glance, for the majority of them have the long legs, long, slender neck, and elongated bills broadly characteristic of the Storks; but, as will be shown later, these characters are on the whole rather superficial, for birds that are really not very closely related to them, such as Cranes and Rails, possess many of the same features, while others are so very unlike the typical Stork-like form that the casual observer would never think of placing them together. And in this connection it may be confessed that ornithologists themselves are by no means agreed as to the closeness of relationship implied by placing them in the same order. Some students would separate quite widely the groups here brought together, but as the state of our knowledge is not such as to afford a final word on the subject, it may be accepted as perhaps the best expression of the facts now obtainable.

The characters relied upon for defining this order are necessarily of a somewhat technical nature, but there seems no way of avoiding their use. Therefore the *Ciconiiformes* may be described as birds in which the feet are not raptorial, but are fitted for wading or swimming. They are either wading birds with very long legs and toes not fully webbed, or if the toes are fully webbed the bill is bent abruptly downward from the middle, or they are swimming birds with the hallux connected with the inner toe by a full web. The palate is of the so-called "band form" (desmognathous); the basipterygoid processes at the base of the skull are absent, as is the spina interna; the coracohumeral groove is deep and distinct; there is but a single pair of tracheosternal muscles, and the blind intestines (cæca) are rudimentary and not functional.

The order *Ciconiiformes* may be divided into four well-marked suborders: the *Steganopodes* or Totipalmate Swimmers (Tropic-birds, Cormorants, Anhingas, Pelicans, Gannets, and Man-o'-war Birds), the *Ardeæ* or Herons and their allies, the *Ciconiæ* or Storks and Ibises, and the *Phœnicopteri* or Flamingos. As will be later set forth more at length, there are differences of opinion as to the placing of the Flamingos in the *Ciconiiformes*, some, indeed, giving them independent ordinal rank between the present and the following order (*Anseriformes*). This would rather accord with the views of Huxley, but later studies would seem to range them more nearly with the Stork-like birds. The superfamilies and families into which they are variously divided are more fully described under their respective headings.

THE TOTIPALMATE SWIMMERS

(Suborder *Steganopodes*)

This is a small suborder or order, as it is often denominated, of rather large aquatic, often oceanic, birds, that may be known at once by having all four toes connected by webs. There are, of course, a number of other mainly technical characters, but this "one feature is sufficient to define the group." They are disposed in six families, seven genera, and about seventy-five living species, with some thirty-five more or less satisfactory fossil species.

THE TROPIC-BIRDS

(Family *Phaëthontidæ*)

According to the ancient Greek mythology, Phaëthon, son of Helios, one day attempted to drive the celestial chariot in its course across the sky, but the fiery steeds recognized the unaccustomed hand, and swerved from the usual path, causing dire disaster. In fanciful mood Linnæus gave the name of *Phaëthon* to the Tropic-birds, inasmuch as they, in their wanderings, follow mainly the path of the sun, though occasionally the power of the gale may, as did the untamed steeds of Phaëthon, force them far from their usual course. "The Tropic-bird," says Nuttall, "soaring perpetually over the tepid seas, where it dwells without materially straying beyond the verge of the ecliptic, seems to attend the car of the sun under the mild zone of the tropics, and advises the mariner with unerring certainty of his entrance within the torrid climes."

The Tropic-birds, or "boatswains," as they are often called by the sailors, number six or seven forms, some of which are occasionally found in the United States. They have a compressed, pointed, and slightly curved bill, with the cutting edges of the mandibles serrated. In color the bill is yellow, orange, or coral-red, the wings are long and rather narrow, and the tail of twelve to sixteen feathers, of which the middle pair are greatly elongated and attenuated. The general color of the plumage is white or pinkish throughout, and very soft and satiny in appearance.

In general appearance the Tropic-birds are quite suggestive of Terns, although distinguished at once by the elongated middle, instead of lateral, tail-feathers. From the Frigate-birds, their companions of the deep, they are distinguished by the color of the plumage, the shape of the bill, the absence of a bare spot about the eyes and no throat sac, as well as by the elongated middle tail-feathers.

The Tropic-birds are strictly birds of the ocean and are often seen hundreds of miles from land. Not infrequently when thus far from shore they come, in a more or less exhausted state, to find rest in the rigging of a ship. Although they fly for great distances their flight is not the easy, graceful motion of, for instance, an Albatross, but consists of "regular and rather rapid strokes of the wing, without any apparent intermission." Their food consists largely of fish

which they capture by dashing perpendicularly into the water after the manner of the Terns. The Tropic birds make no nest or but a slight one and deposit their single egg in holes or crevices in rocks, occasionally in a hollow tree or on the bare sand. The egg is about 2.10 × 1.55 inches, "dilute claret brown or whitish speckled, sprinkled, spotted, or blotched with deep claret-brown." The birds during incubation sit closely and fearlessly, allowing themselves to be pushed aside or taken in the hand with no more of protest than a sharp stroke with the bill or a hoarse cry; both sexes take part in incubation.

Perhaps the best known species is the Red billed Tropic bird (*P. æthereus*) of the tropical portions of the Pacific and Atlantic oceans, coming north on the Pacific coast to Lower California, and accidentally as far north as the Newfoundland Banks on the Atlantic side. It is nearly forty inches in length, with the

FIG. 36. — Yellow-billed Tropic-bird, *Phaëton americanus*.

central tail-feathers about twenty-six inches long. The bright coral-red bill, the satin white plumage, the elongated tail-feathers, which are snow-white with black shafts, make this a very beautiful bird. The Yellow-billed Tropic-bird (*P. americanus*) is a smaller species, only about thirty inches long, found on the east coast of North America from Bermuda to the West Indies. It is occasionally seen on the Florida coast and may be known at once by the yellow bill and the pinkish, black-shafted middle tail-feathers. The Red-tailed Tropic-bird (*P. rubicaudus*), normally of the South Pacific and Indian oceans, though occasionally taken as far north as Lower and southern California, has the middle tail-feathers carmine with black shafts. Mr. W. K. Fisher, who has enjoyed exceptional opportunities of studying it in one of its best-known breeding centers on Laysan Island, writes of its habits as follows: "It nests under the shelter of bushes and not infrequently several will congregate beneath colonies of *Fregata aquila*, occupying the ground floor as it were. The bird has a vicious temper, and if one attempts to disturb or to take it from the egg, it sets up a horrible

and discordant screaming, which soon grows unbearable. The sharp beak with serrated edges is not to be despised, and the enraged bird will sometimes use it to good advantage. The Bow's'n-birds keep up their strident cries so long as one meddles with them, but if left undisturbed will soon quiet down. Whenever we inadvertently passed near one hidden under a chenopodium bush, we soon became aware of its presence by its cry of defiance. To see these birds at their best one must watch them flying about in the bright sunshine, when their pale, salmon-pink plumage shines as though burnished, and the satiny feathers stand out like scales. The two long, red tail-feathers are possessed by both sexes, and the female is only a trifle less pink than the male. Usually when flying about they were quiet, and progressed by short, nervous wing-beats, never attempting to sail. Occasionally, however, they swooped about our heads and made the neighborhood lively. The nest is merely a hollow in the sand, with a few grass straws and leaves gathered in the bottom. The single egg is brooded by both parents, each of which sits upon it with the wings slightly opened." The Yellow Tropic-bird (*P. fulvus*) has the general color of the plumage, a rich salmon inclining to orange. It is found only about Christmas Island, in the Indian Ocean, where of its habits Mr. C. W. Andrews writes as follows: "The flight of these birds is swift, though, owing to the rapidity of the strokes of the wing, it seems as if they were laboring. I never saw them sail except for a short distance when wheeling around. On hot days they may be seen in twos and threes, flying rapidly up and down above and among the tree-tops, continually uttering their peculiar cackling cry, and pausing now and then to hover before holes in the trees which seem to offer an eligible position for a nest. It can hardly be said, however, that they make a nest, for the single, dark brown mottled egg is merely placed in a slight hollow on the floor of a hole in a tree or in the sea cliff."

THE PELICANS

(Family *Pelecanidæ*)

The next family in order comprises the curious and interesting Pelicans. They are, as is well known, birds of large size, ranging in length from about fifty to some seventy-two inches. They have short legs, very large wings which often spread nearly ten feet, for they are strong fliers, and a tail of twenty-two or twenty-four rather short, soft feathers. The most marked peculiarity is of course the huge pouch which depends from the lower mandible, forming, as it has often been called, a regular scoop-net. The length of the bill in some species is fully eighteen inches, though the average length is only about fourteen or fifteen inches. As the bird is seen at rest on the ground it presents a very awkward and grotesque appearance, the neck being held in what would seem to be a very uncomfortable and "kinked" position, but an examination of the skeleton reveals the fact that the eighth or ninth vertebra is curiously articulated with the one in front and the one next behind it, so that it is actually impossible for the neck to be held straight. In at least one species, the White Pelican (*P. erythrorhynchos*) of North America,

FIG. 37. — Brown Pelicans, *Pelecanus occidentalis*, nesting on Pelican Island, Indian River, Florida. (Courtesy of the American Museum of Natural History.)

there is a very remarkable excrescence near the middle of the upper mandible, which is assumed only during the breeding season. This excrescence or "centerboard," as it is called, is described as follows by Mr. Ridgway: "It is assumed gradually in the spring, reaches its perfect development in the pairing season, and it is dropped before or soon after the young are hatched. Frequently it consists of a single piece, nearly as high as long, its vertical outlines almost parallel, and the upper outline quite regularly convex, the largest specimen seen being about three inches high by as many long. More frequently, however, it is very irregular in shape and usually less elevated." Its function is purely problematical. Coincident with the shedding of this appendage in this species the "nuchal crest falls off, and in its place a patch of short, brownish gray feathers appears; this disappears with the fall moult, when the occiput is entirely unadorned, there being neither crest nor colored patch."

The Pelicans (*Pelecanus*), of which ten species are now recognized, are widely distributed throughout the tropical and temperate regions of the Old and New Worlds, North America laying claim to three species. They are a very old group, for some nine fossil forms have been described, the oldest being from the lower Miocene of France. Their food consists almost entirely of fish, of which they capture great numbers.

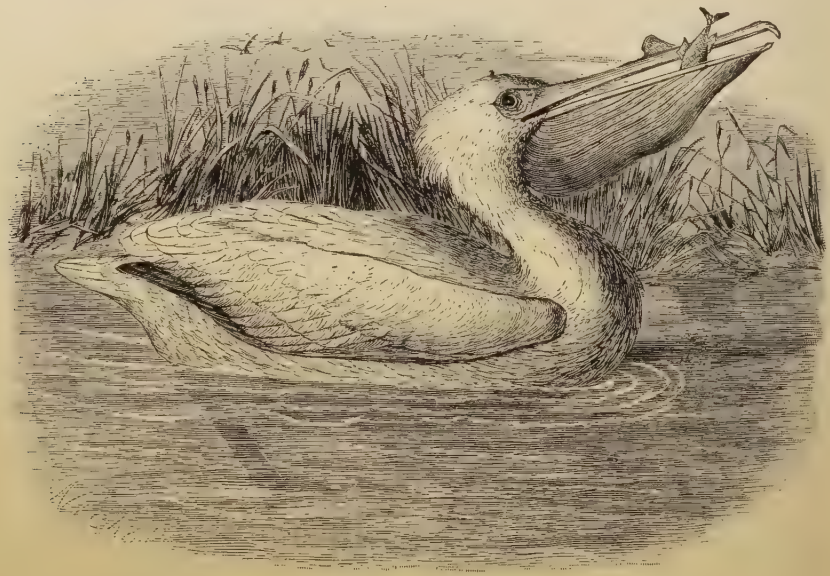


Fig. 38. — American White Pelican, *Pelecanus erythrorhynchos.*

Brown Pelican. — The following account of the manner of feeding of the Brown Pelican (*P. occidentalis*) is from the pen of Dr. Brewer: "Birds of this species are said to feed chiefly during the rising tide, wandering in extended trains

along the shore, and diving occasionally, one after the other, when they meet with a shoal of fish. They are very regular in their motions when flying, keeping at uniform distances, alternately flapping and sailing in imitation of their leader. They usually fly very close to the surface of the water, and then merely plunge obliquely, holding the bill so as to scoop up the small fish sideways; then, closing their wings, they hold up the head with the bill down so as to allow the water to run out. This permits the escape of some of the fish, and gives the parasitic Gull a chance to obtain a share of the plunder, without in the least offending the dignified Pelican. Sometimes this bird dives from a considerable height, plunging downward with a spiral motion, although scarcely ever going beneath the surface, but immediately raising its bill from the water — usually with a stock of young fish in it. As a general rule this Pelican does not catch fish more than six inches long; but occasionally one weighing more than two pounds and a half may be found in its pouch."

Mr. F. M. Chapman in his "Bird Studies with a Camera" and other places has given an entertaining account of a visit to the breeding grounds of this species in the Indian River region of Florida, where they are now under government protection. He found many hundreds of nests containing either eggs or young in various stages of growth. The young were fed but twice a day, the old birds leaving at dawn for the fishing grounds, often many miles away, flying in the above-described regular manner, returning to the nests about eight o'clock. In feeding them they alighted by the side of the young birds, opened the bill and permitted them to help themselves. The old birds then bathed in the adjacent water, or preened their feathers while disposed in long lines on the sand-bars, or sailed for hours high overhead. By the middle of the afternoon they left for a second trip to the fishing grounds, "and after the resulting catch has been delivered to the clamoring young, the Pelican's day's work is over."

Other species feed in a somewhat different manner. Selecting shallow water, they dispose themselves in long lines, at about equal distances apart, and regularly and systematically fish backward and forward until satisfied. I have observed the White Pelican (*P. erythrorhynchos*) doing this on the Yellowstone Lake in the Yellowstone National Park.

As may have been gathered from the above statements, Pelicans nest in communities, usually on an island. The nest is a very rude affair, consisting of a quantity of earth, gravel, and rubbish heaped together to a height of a few inches. The eggs vary in number from one to three or four, the former apparently being the usual complement. They are pure white, with the shell rough and chalky, and often blood-stained.

THE CORMORANTS

(Family *Phalacrocoracidæ*)

This family is by far the largest of the order, containing, in fact, a greater number of species than all the others combined. It is also a very old family, for some ten fossil forms have been characterized, of which two are from the lower,

and one from the middle, Miocene of France; the others, from later geological horizons, are reported from New Zealand, India, and North and South America. In addition to these strictly fossil species, the largest species of the principal genus, Pallas's Cormorant, has probably been extinct for some fifty years. Another indication of the antiquity of the family is shown by the fact that one species — the recently described Harris's Cormorant — has been isolated in the Galapagos Islands for a sufficient length of time to have lost the power of flight. This interesting bird will be more fully described later.

This family embraces two genera, *Phalacrocorax*, the Cormorants or Shags as they are often called, with over forty species, and the monotypic *Nannopterum*, the Harris's Cormorant. Their nearest of kin are the Anhingas, or Snake-birds, which have often been placed with them as a subfamily, but they differ from them in having a subcylindrical, strongly hooked bill with the cutting edges entire, instead of an elongated, simply pointed bill with serrated cutting edges. A further anatomical difference is found in the occipital style, this being large in the Cormorants and very feebly developed in the Anhingas. In both the feather covering is almost uninterrupted.

The Cormorants are birds between two and three feet in length, with an elongated, powerful body, short, stout legs, and a rather long neck. The wings are concave and rather short, reaching but little beyond the base of the tail; the third quill is longest. The tail consists of twelve or fourteen very stiff feathers. The face and throat are naked. The plumage is usually very compact, dark-colored, and glossy, with greenish or bluish green reflections. The head is often crested and during the nesting season the head and neck are often ornamented with more or less conspicuous plumes of slender, hair-like feathers which disappear after the breeding season is over.

In the matter of distribution the Cormorants as a group are almost cosmopolitan, ranging from Greenland, Alaska, and Siberia on the north to New Zealand and Kerguelen Island on the south, being, however, most abundant in the tropics. Some of the species enjoy a very wide range, as, for example, the Common Cormorant (*P. carbo*), which is found in Europe, Greenland, eastern North America, all of Africa, and through northern Asia and the Indian peninsula to China and Australia, while others are restricted to single islands. About a dozen forms are found in North America, three or four in Europe, some five in Africa, and, according to Buller, about ten in New Zealand.

Cormorants are sociable birds, often congregating in flocks of immense size. Some of the species are mainly confined to ocean shores, while others make their home in inland swamps and marshes. They feed exclusively on fishes, which they are extremely dexterous in capturing. They swim well and often pursue their prey under water, but in general they select some post, projecting rock, or branch over the water, "in a position where their powers of vision enable them to discover a passing fish, upon which they pounce with a never failing aim." Its captures are held securely with the sharp, hooked, horny point of the upper mandible, and as the throat is greatly dilatable it can swallow fish of large size.

During the nesting season the birds usually remain together and nest in

FIG. 39. — Brandt's Cormorant, *Phalacrocorax penicillatus*, breeding off California. (Courtesy of the American Museum of Natural History.)

communities, often of considerable size. The place selected varies somewhat with the different species and also according to the exigencies of the situation, some choosing a rocky cliff facing the sea and others low trees and bushes along low-lying shores. The nest is usually a rude affair placed on the bare rock or ground or raised on a slight mound of sticks and weeds, or when placed in bushes of sticks loosely put together. The eggs are from three to five in number, of rather large size and pale pinkish green, with a rough crust or coating of calcareous matter. The young are very ungainly and awkward when first born and are quite helpless for some time. They feed themselves by thrusting their heads well down into their parents' throats and "extracting the half-digested fish from their stomachs."

Cormorants possess a considerable degree of intelligence and may be readily tamed if taken when young, evincing a warm regard for their owner. In some parts of the world, notably in China, they are taught to fish for their master. The young birds, or those not perfectly trained, have a strap or cord placed around the neck to prevent their swallowing the fish taken, and they soon learn to bring all captures to their master. After securing a sufficient quantity the strap is removed and they are permitted to fish for themselves. These trained birds usually last for about five years and have a considerable value, a well-trained male bringing some six or seven dollars.

Harris's Cormorant. — In 1898 a remarkable flightless Cormorant (*Phalacrocorax* or *Nannopterum harrisi*) was described from the Galapagos Islands. So far as then known it was found only on the north shore of Narborough Island, where it frequented the surf, being very shy and difficult to approach. It is the largest known Cormorant, being if anything larger than the extinct Pallas's Cormorant. The mature bird is brownish black above and a mixture of pale brown and gray below, with the tail black, and the wing-quills blackish brown with grayish tips on the outer margin. The feathers are soft and quite incapable of supporting the bird in flight, being of about the size of those of the Great Auk. The true Cormorants possess eleven primaries in the wings, only ten of which are functional, while in the Harris's Cormorant there are also eleven primaries, but the two outer are very greatly reduced, leaving only nine that are functional. There are also numerous differences in the skeleton, showing that the loss of flight has produced important modifications. They are reported as being abundant in the surf and on the shore and rocks of Narborough Island, and less numerous on Albemarle Island. "When on shore they sit in an upright position and often extend the wings with their planes vertical, somewhat in the manner of Vultures while digesting their food. In the water they have a very graceful appearance, carrying the neck bent in a very Swan-like fashion. The adults never were heard to make any sound. The food consists largely of devil-fish, which the birds obtain by diving. Some were observed swallowing devil-fish more than a foot in length. Fish also form a part of their food. The young are fed by the parents' disgorged food until they have attained nearly adult size." The nests were made of cone-shaped masses of seaweed about a foot high.

THE ANHINGAS, OR DARTERS

(Family *Anhingidæ*)

The Anhingas, Darters, or Snake birds are readily distinguished from the other members of the group and more particularly from their nearest of kin, the Cormorants, by their elongated bodies, excessively long, slender, snake-like necks, very small, narrow heads, and the slender, nearly straight, and very sharp-pointed bills. The bill is not hooked at the tip although somewhat serrated. The neck has "a bend at the 8th or 9th vertebra, and is provided with a peculiar mechanism which enables the bird, by suddenly straightening the neck, to transfix with its bill the fishes it captures." The wings are quite long and pointed, while the rounded tail is composed of twelve stiff, somewhat wedge-shaped feathers, — the broadest end outward, in addition to which the middle pair are transversely ribbed. The body is nearly uniformly clothed with small, rather soft, contour feathers, and very delicate down feathers. With the exception of the lateral spaces of the trunk, only a narrow inferior bare space is to be found. In length these birds range from about twenty-eight to thirty-six inches.

Although only four species of Darters are known, they enjoy a wide distribution in the tropics or warmer regions of both hemispheres, one species, the Snake-bird, or Water Turkey (*A. anhinga*), being found over the whole of tropical and subtropical America, ranging north to South Carolina, southern Illinois, and western Mexico. It is one of the largest species, being from thirty-two to thirty-six inches in length. The male has the upper parts glossy greenish black, the wing-coverts spotted with silver-gray; the lower parts are deep black. The female and young are more grayish, while the male is provided with a sort of mane of elongated hair-like feathers. The African Darter (*A. levaillantii*) is found in North Syria, northern Africa, and Madagascar. It is dark brown or reddish brown above, with a white band extending from the eye for about five inches down each side of the neck. The Indian or Black-bellied Darter (*A. melanogaster*) is very widely distributed, ranging from Mesopotamia to India, Ceylon, and the Indo-Chinese countries, and through the Malay Peninsula to Borneo and the Philippines; it is quite similar to the last. The Southern Darter (*A. novæ-hollandiæ*), found in Australia, New Guinea, and New Zealand, is glossy black above and has the white stripes on the sides of the neck much as in the Indian Darter.

I select the following account of the habits from Dr. Brewer's history of the American species, the habits of the others being similar. "It lives principally upon fish, which it seizes by rapidly darting upon them with its sharply pointed and slightly toothed beak. In this movement its neck, which is very long, is thrust forward with the force of a spring, aided by the muscles, that are large and well developed in the lower and anterior portion of the neck. When fishing, the Anhinga stands with only its head and neck above the water; when it makes a plunge it remains a long while beneath the surface; and when it rises again, the long and undulating neck has somewhat the appearance of a serpent.

FIG. 40. — Snake-bird, or Darter, *Anhinga anhinga*. (Courtesy of the American Museum of Natural History.)

"It is more or less gregarious by habit, the number seen together varying with the attractions of the locality, and ranging from eight or ten to thirty, or even several hundred. In the breeding season it moves in pairs. It is a diurnal bird, and if unmolested, returns each night to the same roosting place. When asleep it is said to stand with its body almost erect.

"This is said to be the very first among fresh-water divers, disappearing beneath the surface with the quickness of thought, moving scarcely a ripple on the spot, and reappearing, perhaps with its head only above the water for a moment, at a place several hundred yards distant. If hit, and only wounded, this bird readily baffles all the endeavors of the sportsman to secure it. When swimming, and unmolested, it is buoyant, and moves with its whole body above the water, but when in danger it sinks its body, leaving only the head and neck out of the water, presenting the appearance of a portion of a large snake."

At times these birds rise to a considerable height in the air, — 2000 or more feet, probably, where they soar with ease, remaining in the air for a considerable period of time. They nest somewhat in colonies in swamps, selecting secluded localities where they are not likely to be interrupted. The nest is a rather loosely made structure of sticks, leaves, and moss, and is placed in low bushes over the water; the three to five eggs are bluish, covered with a whitish chalky deposit.

THE GANNETS

(Family *Sulidæ*)

Gannet, Booby, and Solan-goose are the names variously applied to the members of this small family. The first, and perhaps most widely employed, is Gannet, a word derived apparently from the Old English *gan*, after the manner of gander and goose. The simple or foolish appearance of the birds, especially when on land, furnishes an explanation of the name Booby, while the last mentioned, or Solan-goose, is seemingly from the Scandinavian, signifying "Sea-goose."

The Gannets, or Boobies, are large birds, ranging from about twenty-eight inches to thirty-six inches in length, with rather long, very pointed wings, and a long, wedge-shaped tail of twelve to eighteen feathers. The bill is stout, subcylindrical and pointed, tapering gradually toward the extremity, which is very slightly curved but never hooked. The nostrils are completely closed in the adults, a provision, as will be seen later, against injury while feeding, and in several of the species there is a naked band of greater or less length down the middle of the throat, while in the remaining species the whole upper part of the throat is naked. In a majority of the species the plumage is white throughout except the wings and tail, which are usually black or dusky; in the other species the color is dusky or sooty brown.

The Gannets are birds of temperate and tropical seas, and are often found at great distances from land. Their food consists entirely of fish, especially herrings, the presence of which they often indicate to fishermen. "Their prey,"

says Newton, "is almost invariably captured by plunging upon it from a height, and a company of Gannets fishing presents a curious and interesting spectacle. Flying in single file, each bird, when it comes over the shoal, closes its wings and dashes perpendicularly and with a velocity that must be seen to be appreciated, into the waves, whence it emerges after a few seconds, and shaking the water from its feathers, mounts in a wide curve, orderly takes its place in the rear of the string, to repeat its headlong plunge as soon as it again finds itself above its prey." Chapman says: "They are most impressive when diving, as with half-closed wings, like great spearheads, they descend from a height of about forty

FIG. 41. — Common Gannet, *Sula bassana*.

feet with a force and speed that takes them wholly out of sight, and splashes the water ten feet or more into the air." Although they are not provided with a throat pouch, as are several of their relatives, the throat is greatly dilatable, which permits them to swallow fish of considerable size. They are said never to carry fish to their young in their bills, but to feed them by disgorging. They nest in communities, often of vast extent, on rocky and inaccessible islands and headlands, building but a rude nest of a few grasses and seaweeds. One or two eggs are laid, which are described as being elliptical in form, with a rough, dull white or chalky white surface; the size is about three and one half by one and three fourths inches.

Common Gannet. — The family *Sulidæ* is clearly a very old one, for not less than four fossil species have been described from the Miocene age, three coming from France and one, a very well marked species, from North Carolina. At the present time eleven species are recognized, of which number some four or five are found along the North American coasts. One of the most abundant

and best-known species, and the Gannet *par excellence*, is the Common Gannet (*Sula bassana*), a bird of the coasts of the North Atlantic, coming south in winter to the Gulf of Mexico, and on the European side to North Africa, Madeira, and the Canary Islands. One of the most celebrated of the nesting places is the Bass Rock at the entrance of the Firth of Forth, Scotland. Here Macgillivray, in 1831, estimated that 10,000 pairs were breeding, and this number is said by Hudson (1895) to be still maintained. Although the Bass Rock has been often described and must be familiar to many, I venture to quote, from Mr. Charles Dixon, a very graphic account of a visit to this spot: "Upon reaching the Bass a few Gannets may be seen sailing dreamily about, but you have no idea of the immense numbers until you have climbed the rugged hill. But when the summit of the cliff is reached the scene that bursts upon one's gaze is one that well-nigh baffles all description. Thousands upon thousands of Gannets fill the air, just like heavy snowflakes, and on every side their loud, harsh cries of 'carra-carra-carra,' echo and reëcho among the rocks. The Gannets take very little notice of our approach, many birds allowing themselves to be actually pushed from their nests. Others utter harsh notes, and with flapping wings offer some show of resistance, only taking wing when absolutely compelled to do so, and disgorging one or two half-digested fish as they fall lightly over the cliffs into the air. On all sides facing the sea Gannets may be seen. Some are standing on the short grass on the edge of the cliffs, fast asleep, with their heads buried under their dorsal plumage; others are preening their feathers; whilst many are quarreling and fighting over standing-room on the rocks."

Mr. Dixon describes another great breeding place on Borreag, an island about four miles from St. Kilda. "The flat, sloping top of one of these stupendous ocean rocks looks white as the driven snow, so thickly do the Gannets cluster there, and the sides are just as densely populated wherever the cliff is rugged and broken. So vast is this colony of birds that it may be seen distinctly forty miles away, looking like some huge vessel under full sail heading to windward."

But vast as are these nesting places, they are really insignificant as compared with conditions which prevailed on the Bird Rocks in the Gulf of St. Lawrence, less than fifty years ago. The Great Bird is a mass of rock, only about 350 yards long and from 50 to 150 yards wide, which rises abruptly from the sea, with mostly precipitous walls from 80 to 140 feet in height. The Little Bird is three quarters of a mile away; it is lower and much smaller.

One of the first, or perhaps the first, accounts of the Bird Rocks is by Jacques Cartier, written in 1534. In this he says: "These islands were as full of birds as any meadow is of grass, of which they do make their nests, and in the greater of them there was a great and infinite number of those we called Margaulx (Gannets), that are white and bigger than any geese." Audubon passed these rocks in 1833, while on his cruise to Labrador, and "thought them covered with snow to the depth of several feet." On a closer approach he found that the "snow" was resolved into myriads of Gannets, showing that there had been little diminution in the numbers during the preceding three hundred years. In 1860 the Bird Rocks were visited by Dr. Henry Bryant, who appears to have been the

first ornithologist to actually set foot there. He found the Gannets occupying the whole northern half of the summit as well as many ledges along the sides and in numbers that are almost incredible. He estimated the number on the summit at fifty thousand pairs, with about half as many more on the ledges. His description is graphic in the extreme.

A few years later (1869) the Canadian government erected a lighthouse on the Rock and this was the beginning of the end, for several means of reaching the summit were provided, and the locality was resorted to by fishermen, who killed the Gannets, and other species as well, by the thousands, using the bodies as fish-bait. The eggs were also gathered in quantities, and by the year 1872, when the Rock was visited by Mr. C. J. Maynard, a well-known ornithologist, the number of Gannets occupying the summit had decreased to about five thousand birds, and in 1881, Mr. William Brewster could find no more than fifty pairs. Others have since visited the Rock, and for nearly twenty years no Gannets have been reported as nesting on the summit. Mr. F. M. Chapman paid this interesting locality a visit in the summer of 1898, when he secured many photographs of the bird inhabitants. He estimates the total number of Gannets at fifteen hundred, which are all that remain of the one hundred and fifty thousand noted by Bryant.

Another common and widely distributed species is the Booby Gannet, or Booby (*S. leucogastra*), as it is commonly called, which is found in tropical and subtropical seas practically throughout the world, except the Pacific coast of America, where its place is taken by the closely allied Brewster's Gannet (*S. brewsteri*). On the Atlantic coast it is found as far north as Georgia, nesting on certain of the West Indian islands, where, according to Bryant, it deposits the eggs, always two in number, on the bare sand or rock. The habits of life are much like those of the former species, except it is frequently made the victim of the Frigate-birds.

Brewster's Booby was found by Goss on the San Pedro Martir Isle in the Gulf of California, where, he says: "The birds were not wild; they seemed to prefer the shelves and niches on the sides of the rocks as nesting places. They lay two eggs, and in all cases collect a few sticks, seaweed, and often old wing- or tail-feathers; these are generally placed in a circle to fit the body, with a view, I think, to keep the eggs that lie upon the rock from rolling out."

THE FRIGATE–BIRDS

(Family *Fregatidæ*)

Sharing the tropical oceans with the Tropic-birds are the so-called Frigate-birds or Man-o'-war Birds, of which three forms only are known. They are very powerful flying birds from thirty to forty inches in length, remarkable at once for the extremely short tarsus, greatly elongated wings, and a long, deeply forked swallow-like tail. In the mature males the plumage is black throughout,

though the adult male of *F. ariel* has conspicuous white flank-patches, while the feathers of the back are glossed with metallic green and reddish purple. The females are blackish above but have the breast and sides white, while the immature young have the head, neck, and upper part of the chest as well as the middle of the lower breast and abdomen white. Further distinguishing marks are afforded by the very long, strongly hooked bill, the flattened, fringed claw on the middle toe, and the very narrow web. The bones of the skeleton are extremely pneumatic, perhaps more so than in any other bird, for the Frigate-bird is a marvel of lightness and grace on the wing. In the male there is a curious

Fig. 42. — Frigate-bird, *Fregata aquila.*

pouch under the bill which is capable of inflation at the will of the bird to sometimes half or more the size of the body. This is bright scarlet in color, and contrasts strongly with dark plumage.

The food of the Frigate-birds consists of fish, a part of which they capture themselves, but in the main they apparently subsist by robbing the more industrious Gannets and Terns. On observing a successful fisherman they give chase, and no matter how fast he may fly or how often he may turn, the pursuer is always at hand, and finally in despair he drops the fish, which is caught before it can reach the water.

The Frigate-birds may often be seen soaring at vast heights, from which they often drop like an arrow. Scott, who saw them about the Dry Tortugas, says: "Almost every day about noon a party of from four to twenty of these birds (*F. aquila*) came to Garden Key, and attaining a point just above the Harbor Light Tower on the northeast wall of the fort, they would begin to soar in what seemed

to be a sort of way of resting. The circles were of about one hundred feet diameter; the flight very regular, slow, and monotonous, with no apparent motion of the wings for hours. It tired me to look at them."

Of the two species the larger (*F. aquila*) is found in tropical and subtropical seas of both hemispheres, chiefly north of the equator, coming north in this country regularly to Florida, Texas, and California, and casually to Nova Scotia. A smaller form of this (*F. a. minor*) is found in the central Pacific and Indian oceans, while the still smaller and quite distinct *F. ariel*, the male of which has a conspicuous white flank-patch, occurs also in the tropical and subtropical portions of the same oceans. The Frigate-birds nest in colonies throughout their range, building a very slight nest on mangroves and other low trees, or on the ground. The egg is usually single, pure white, and about two and seventy hundredths by one and seventy-five hundredths inches.

Following is an account, by Mr. J. J. Lister, of a visit to the Phœnix Islands in the South Pacific, where he found the Lesser Frigate-bird (*F. a. minor*) breeding in great numbers. He says: "From the boat I went off to the part of the island over which the Frigate-birds were wheeling. Here I found their nests in great numbers. They were built of small dead twigs of the plants of the island, placed a foot or so above the ground on the spreading branches of the Sida (a shrubby, malvaceous plant two or three feet high) and on the beaten-down tussocks of grass. The nests were placed as near together as supports could be found, and there were well-defined limits to the colonies, although the bushes beyond these limits appeared to be just as well suited for the purpose as those within. Each nest was occupied by a bird. As one approached some of these took flight and joined the whirling crowd overhead, but the rest remained sitting and allowed themselves to be touched with the muzzle of my gun, only chattering their bills by way of remonstrance. Both males and females were to be seen engaged in the duties of incubation.

"The throat-pouch of the male is a most striking object. When fully distended it reaches forward as far as the end of the bill and downwards so as to completely hide the breast, — a great smooth semi-transparent balloon of the most brilliant scarlet, which contrasts finely with the dark metallic tints of the plumage. If any of the birds in a group had their pouches distended, there were generally several in this condition, as though they were vying with one another in the exhibition of their attractions. From several parts of the group came a low, vibrating note, a combination of a whistle and a purr, accompanied by the sound of the chattering of their bills. While uttering this note the bird leans back on the nest, with the head thrown right back, the pouch fully extended, and the wings half spread and shaken with a quivering movement. The female birds meanwhile were either whirling overhead or sitting on the edge of the nest near their admirers.

"The pouch is not rapidly filled or emptied; when a bird with a half-distended pouch takes flight, the latter is carried from side to side with the movement through the air, gradually diminishing in size. In the undistended state the bare, wrinkled skin is completely retracted to the level of the general contour of

the neck. The interior of the pouch is in communication with the air sacs of the neck; it is therefore filled and emptied through the bronchi.

"By far the greater number of nests on Phœnix Island contained a single white egg about as large as a hen's; some nests, however, contained two eggs." Mr. Lister also mentions seeing the Frigate birds drinking from the fresh-water lagoons. As they came "sweeping down to the surface, they scooped up the water with the lower mandible."

THE HERON TRIBE

(Suborder *Ardeæ*)

The second suborder of the *Ciconiiformes*, or Stork-like birds, embraces the Herons and their immediate relatives. They are at once distinguished from the group last considered by their very long legs, which adapt them to wading rather than swimming, although they can all swim to a limited extent when forced to do so. A further distinguishing mark is afforded by the fact that the toes are not completely webbed, and that powder downs are always present. The suborder may perhaps be best divided into four families as follows: the *Ardeidæ*, which includes the Herons, Egrets, Bitterns, etc.; the *Cochleariidæ*, including the American Boat-bills; the *Balænicipitidæ*, embracing the anomalous Shoe-bill; and the *Scopidæ*, for the almost equally remarkable Umbrette, the latter two being African.

THE HERONS

(Family *Ardeidæ*)

Beyond the fact already pointed out of their resemblance to the Cranes and Rails, the Herons form a relatively compact and generally well-known group. They have long or moderately long legs, the front of the metatarsus being covered with scute-like plates. There are always four toes, the hind toe being on the same plane as the others, and the claw of the middle one is comb-like on the inner side. The body is thin and compressed, the neck usually long, and the bill long and pointed, with all the outlines nearly straight. The wings are relatively large, but are very much rounded from the fact that the second, third, and fourth quills are of nearly the same length. The lores and a space about the eyes are bare. "The general plumage, which is very variable in color, is soft and loose; the feathers on the crown of the head, back, and upper breast being frequently elongated." The peculiar powder-down patches on the rump, abdomen, and elsewhere are always present and constitute a well-known character of the group.

In the matter of distribution, Herons are almost cosmopolitan, being, however, most abundant in tropical and subtropical regions. They are inhabitants for the most part of swamps and marshes, a few only preferring the seacoast. They are often gregarious, feeding and nesting in communities, where they build large, bulky nests, frequently in trees. They may often be seen walking about in or along marshes with a slow and measured gait; when on the wing their progress

is rather slow, although strong, and is accompanied by a continuous flapping of the wings. In general they lay from three or four to six unspotted eggs, which are bluish green or whitish in color.

The group is an old one, some half a dozen species having been found fossil, the oldest being from the lower Eocene of England. A single fossil species (*Ardea paloccidentalis*) has been found in North America, and another (*A. megacephala*) has disappeared in comparatively recent times from the island of Rodriguez.

Over one hundred living species are known, distributed, according to Sharpe, among thirty-seven genera, but this number of genera is perhaps excessive, since

Fig. 43. — Great Blue Heron, *Ardea herodias*.

the differences between some of the groups seem hardly worthy of full generic rank. North America possesses some eighteen forms, these being lately referred by American ornithologists to no less than eleven genera, most of which were formerly accorded only subgeneric rank.

The true Herons belong to the genus *Ardea* and number some dozen or more species. They are quite variable in size, ranging from twenty-eight to fifty-six inches in length; in color there is likewise considerable variation. Of the habits of Herons in general, Hudson, in his "Argentine Ornithology," says: "Two interesting traits of the Heron (and they have a necessary connection) are its tireless watchfulness and its insatiable voracity; for these characters have not, I think, been exaggerated even by the most sensational of ornithologists. In other birds of other genera, repletion is invariably followed by a period of listless inactivity during which no food is taken or required. But the Heron digests his food so rapidly that, however much he devours, he is always ready to gorge again; conse-

quently he is not benefited by what he eats, and appears in the same state of semi-starvation when food is abundant as in times of scarcity. . . . All other species that feed at the same table with the Heron, from the little flitting Kingfisher to the towering Flamingo, become excessively fat at certain seasons, and are at all times so healthy and vigorous that, compared with them, the Heron is the mere ghost of a bird. In no extraneous circumstances, but in the organization of the bird itself, must be sought the cause of its anomalous condition; it does not appear to possess the fat elaborating power, for at no season is any fat found on its dry, starved flesh;[1] consequently there is no provision for a rainy day, and the misery of the bird (if it is miserable) consists in its perpetual, never satisfied craving for food."

Great Blue and Ward's Herons. — One of the largest and most widely distributed of the North American species is the Great Blue Heron (*A. herodias*), which is found from the sub-Arctic regions southward to the West Indies and northern South America. It stands from forty two to fifty inches in height and has an extent of wings of about seventy-two inches, the coloration being nearly uniform bluish gray above, with the lower parts black or dusky, broadly striped with white. The occiput and sides of the crown are black, while the forehead and center of the crown are pure white, though in the young the whole top of the head is dusky.

The Great Blue Heron was formerly not uncommon throughout much of the eastern part of the United States, but is yearly becoming scarcer. It nests more or less in communities, building a large, flat nest of coarse sticks, occasionally placing it in low trees and bushes, but usually it is at a height of fifty feet or more. The eggs, from four to six in number, are about two and sixty-five hundredths inches by one and eighty hundredths inches; they are greenish blue in color. Of its habits Brewer says: "It usually fishes in the early morning and in the evening, often wading up to its tarsal joint in the water, standing motionless, watching until its prey comes near, and then seizing it by a very rapid stroke of the bill, and swallowing it head downward. It also feeds on meadow mice, frogs, small birds, grasshoppers, etc." Very similar to this, although decidedly larger, is Ward's Heron (*A. h. wardi*) of western and central Florida, which has the legs yellowish instead of black.

European Blue Heron. — The European Blue Heron (*A. cinerea*), found in Europe, Asia, Africa, and Australia, and accidentally in Greenland, is colored very much like the two species above described, but differs in having the thighs and the edge of the wing white instead of cinnamon-rufous. It is also smaller, being but about three feet in length. This species was formerly abundant in England, where it was preserved for the royal sport of hawking, but with the decline of this sport it has almost disappeared except in a few protected localities.

Great White Heron. — Another striking American species is the Great White Heron (*A. occidentalis*) of Florida and the Greater Antilles, which is entirely pure white in color, with elongated ornamental plumes on the fore neck. Its

[1] This, however, is not always true. I have occasionally skinned Herons that were decidedly fat. — R. R.

FIG. 44. — Ward's Heron, *Ardea herodias wardi*. (Courtesy of the American Museum of Natural History.)

habits are similar to those of the Great Blue Heron except that it is perhaps more sedate and less animated. It collects in flocks often of a hundred or more on the flats and sand-bars where it feeds.

The **Goliath Heron** (*A. goliath*) of tropical Africa and occasional in India is another elegant species, being about fifty four inches in length and having the head and crest-feathers chestnut. South America is also the home of a species allied to the European Heron, namely, the Cocoi Heron (*A. cocoi*). This species, however, does not nest in communities, at least in Argentina, and is usually seen singly or in pairs, fishing along streams and marshes.

Egrets. –The large Egrets form a very interesting and showy group, by some referred to the genus *Herodias*, but by others placed in the same genus as those we have been considering. They are pure, often glistening white in color throughout, with beautiful elongated plumes on the back, these constituting the *aigrettes* so highly prized (unfortunately) for millinery decoration. The European species

Fig. 45. — American Egret, *Herodias egretta*.

(*H. alba*), found from southern Europe through central Asia to the Indian peninsula and in Africa, has the bill black in summer and yellow in winter, while the American Egret (*H. egretta*) of temperate and tropical America, and the Timor species (*H. timoriensis*) of Japan, China, the Malay Archipelago, and Australia, have the bill yellow throughout the entire year. The American Egret is a shy bird at all times and a great wanderer. Usually but few are seen together, although in suitable localities, as in Florida and certain places in the Western States, it nests in communities, the nests being placed in bushes or trees, all the way from six to one hundred and fifty feet from the ground. In the South the numbers of this species have been sadly depleted by plume hunters. The Snowy

Egret (*Ardea* (or *Garzetta*) *candidissima*) is another handsome species, twenty to twenty-seven inches in length, pure white in color, with the plumes of head, neck, and back greatly developed, those of the back extending to or beyond the tail and recurved at the tips. It is or was formerly found throughout all the warm portions of North and South America, though it has been practically exterminated in the United States. It is common on the pampas of Argentina, where, Hudson tells us, it is more active and social in its habits than most Herons, being usually seen in small flocks. While there are many other fine Herons, we have space for the mention of but a single additional one, the Agami Heron (*Agamia agami*) of South America. It is a beautiful bird, about thirty-two inches in length, and, as may be seen from our colored plate, is a glossy dark green above, with ornamental plumes of pearly gray on the lower back. The lower parts are largely chestnut in color, while the head is set off by a crest of slaty blue. It is a native of the dense tropical growth from Mexico to Peru and Brazil.

The **Night Herons** (*Nycticorax* and *Nyctanassa*), so called from the fact that they are mainly nocturnal in their habits, are medium-sized Herons, ranging from eighteen to about twenty-four inches in length, of very stout, thick build, with large, thick heads and very thick bills. The prevailing colors are bluish gray, black, and white; but the plumage of the mature birds is exceedingly different from that of the young, being in the latter mainly brownish, striped longitudinally with white; the sexes are, however, similar in each stage, while in the adults there are two or three exceedingly long, thread-like, white occipital plumes.

About a dozen Night Herons are known, two forms being found in North America. The genus is nearly cosmopolitan, except that it does not range very far north. Perhaps the best-known, and certainly the most widely distributed, species is the Black-crowned Night Heron (*N. nycticorax*), which ranges from central and southern Europe to the Indian peninsula, China, Japan, the Malay Peninsula, and Africa, and the American form of it which is found from the British possessions to the Falkland Islands and the West Indies.

The American Black-crowned Night Heron, or Quawk, as it is usually called (*N. nycticorax nævius*), is larger than its European relative, being from twenty-three to twenty-six inches long. It is uniformly glossy, greenish black above, with the forehead, sides of the head, chin, throat, and lower parts generally white, while the wings, rump, and tail are ash-gray in color. This species is widely distributed, ranging from Ontario and Manitoba southward to the Falkland Islands, including part of the West Indies. It nests in communities, often of great size, and as they are practically nocturnal in their habits, a rookery may often exist without attracting much attention. The following interesting account is from the pen of Mr. F. M. Chapman: "One may gain a far better idea of Heron life by visiting the rookery while the foliage is still glistening with dew. Then, from a distance, a chorus of croaks may be heard from the young birds as they receive what, in effect, is their supper. Old birds are still returning from fishing trips, and the frog-like monotone of the young is broken by the sudden *quawks* of their parents. The trees in which the nests were placed are very tall

AGAMI HERON
(*Agamia agami*)

and slender, mere poles some of them, with a single nest where the branches fork; while those more heavily limbed had four, five, and even six of the platforms of sticks, which with Herons serve as nests; but in only a single instance was one nest placed directly below another. A conservative estimate yielded a total of five hundred and twenty-five nests, all within a circle about one hundred yards in diameter, the lowest being about thirty feet from the ground, the highest at least eighty feet above it. On entering the rookery our attention was attracted at once by the nearly grown Herons, who, old enough to leave the nest, had climbed out on the adjoining limbs. There, silhouetted against the sky, they crouched in family groups of two, three, and four. Other broods, inhabitants of more thickly leaved trees, made known their presence above by disgorging a half-digested eel, which dropped with a thud at our feet. The vegetation beneath the well-populated trees was as white as though it had been liberally daubed with whitewash, and the ground was strewn with blue-green egg-shells neatly broken in two across the middle; fish, principally eels, in various stages of digestion and decay; and the bodies of young birds that had met with an untimely death by falling from above. It was not altogether a savory place. As the sun crept upward and the last fishers returned, the calls of both old and young birds were heard less and less often, and by ten o'clock night had fallen on the rookery and the birds were all resting quietly. Four o'clock in the afternoon was evidently early morning, and at this hour the birds first began to leave the rookery for their fishing grounds."

Fig. 46. — European Bittern, *Botaurus stellaris*.

Bitterns. — The only other members of the group to be mentioned are the Bitterns, which are distinguished at once by having only ten tail-feathers and the middle toe with its claw about equal to or greatly exceeding the tarsus. Several genera have been described, the most typical and important being *Botaurus*,[1] which embraces what may be called the true Bitterns. They are small or medium-sized birds with a mottled plumage of buff, brown, and black; the neck is shorter and thicker and the head proportionally larger than in the Herons, and the head is without plumes. They haunt swamps and marshes, where their striped dress harmonizes admirably with the rushes and reeds. They are not at all gregarious, it being rare to find more than two in company even in the nesting season. They feed on crustaceans, lizards, frogs, and insects, and build a loose nest of grasses, etc., usually on the ground in marshes. The eggs are from three to five, pale olive-buff or bluish white in color.

[1] By some systematists *Botaurus* is made to include several of the genera of other authors.

The American Bittern (*B. lentiginosus*) is found throughout temperate North America, Guatemala, and Cuba, while the European species (*B. stellaris*) ranges throughout the temperate parts of the Old World and south to India and Burma.

The origin of the name Bittern, by which these birds are generally known, is open to more or less doubt, but it is apparently a corruption from some name given in imitation of the very peculiar notes of the birds. "The booming of the Bittern" is a familiar expression, and from the earliest times its notes have been variously likened to the bellowing of cattle, the driving of a stake into swampy ground, the working of an old wooden pump, etc. The English species, now almost unknown in that country, was formerly called Bittour, Bator, Butterbump, etc., while the American species is quite generally called the Stake-driver. The following extract from Mudie will give some idea of the note of the European Bittern: "Anon a burst of savage laughter breaks upon you, gratingly loud, and so unwonted and odd that it sounds as if the voices of a bull and a horse were combined, the former breaking down his bellow to suit the neigh of the latter, in mocking you from the sky." Hudson, in his "British Birds," says of the notes, "When flying he utters a harsh, powerful scream, and he has besides a strange vocal performance, called 'booming,' — a sound that resembles the bellowing of a bull."

The American Bittern has no such roar, but produces a sound very suggestive indeed of the driving of a stake. Many attempts have been made to represent the notes by syllables, such as *pump-a-ŭ'gah*, as rendered by Nuttall, *chunk-a-lunk-chunk, quank chunk-a-lunk-chunk,* by Samuels, while according to Bradford Torrey, whom we shall quote later, it is most nearly represented by *plum-pudd'n'*, giving both vowels the sound of *u* in *full*, dwelling a little upon *plum*, and a strong accent on the first syllable of *puddin'*. In any event it is a very peculiar voice which possesses also the power of deceiving the hearer as to the position and distance of the performer. When once heard it is not likely to be forgotten.

The manner in which this curious vocal effort is produced has given rise to most entertaining literature. Some early writers supposed that the bill was put inside a hollow reed to increase the volume of sound, but the greater number insisted that it was made with the bill partly under water, for it sounds, as Audubon well says, "as if the throat was filled with water." I will quote from but one of these accounts, that given by Count Wodzecki of the European species as late as 1852. He says in part: "The artist was standing on both feet, his body horizontal and his bill in the water, and then a rumbling began, the water squirting about all the time. After a few sounds I heard the *ü* sound; the bird lifted his head, threw it backward, and thrust his bill into the water, and then he uttered a roar so fearfully loud that I was frightened."

It appears to be quite commonly supposed that our American Bittern produces the "booming" with the bill partially submerged, and a well-known writer on natural history in this country claims to have been an eye-witness to the performance, stating that "the bird's beak, when it uttered the cry, was not quite

withdrawn from the water, and its voice, therefore, was materially modified by this fact."

As a matter of fact, there is nothing peculiar in the vocal apparatus of the Bittern, and he depends entirely upon it for the production of the notes. It is simply that the natural shyness of the bird makes close observation difficult. In this particular, Torrey on one occasion enjoyed exceptional facilities and gives the following account: "First the bird opens his bill quickly and shuts it with a click; then he does the same thing again with a louder click; and after from three to five such snappings of the beak he gives forth the familiar trisyllabic notes, repeated from three to eight times. With the preliminary motions of the bill the breast is seen to be distending; the dilatation increases until the pumping is well under way and, so far as we could make out, does not subside in the least until the pumping is quite over. It seemed to both of us that the bird was swallowing air, — gulping it down, — and with it distending his crop; and he appeared not to be able to produce the resonant pumping notes until this was accomplished. It should be remarked, however, that the gulps themselves, after the first one or two at least, give rise to familiar sounds of much the same sort. The entire performance, but especially the pumping itself, is attended with violent convulsive movements, the head and neck being thrown upwards and then forwards, — like the Night Heron's when it emits its *quow*, only with much greater violence. The snap of the bill, in particular, is emphasized by a vigorous jerk of the head." Other observers have witnessed much the same state of affairs and all agree that it is produced only by an apparently violent effort, Brewster stating that a bird he once observed appeared "as if he were afflicted with violent nausea or were trying to get rid of some obstruction in his throat."

THE BOAT-BILLS

(Family *Cochleariidæ*)

The present family comprises but a single genus (*Cochlearius*) and two species, the oldest known being the South American Boat-bill (*C. cochlearius*), which ranges from southern Brazil over Amazonia and Guiana to Colombia and Ecuador, and the Central American Boat-bill (*C. zeledoni*), which occurs in suitable situations from Mexico to Panama. They are small Night Heron-like birds, sixteen and eighteen inches in length respectively, their most-marked character being the possession of an enormous bill which is greatly depressed and excessively dilated laterally, the lateral outlines being much bowed. The bill approximates three inches in length and nearly two inches in width, and suggests at once possible kinship with the African Shoe-bill, and the naked skin between the branches of the lower jaw is dilatable into a pouch or bag. As further characters it may be mentioned that the Boat-bills have four pairs of powder-down tracts, which serve to distinguish them from the *Ardeidæ*, which possess but two or three pairs of such areas, while they agree with the latter in having the feather-

tracts very narrow, and the inner edge of the middle claw distinctly pectinated. The possession of a long nuchal crest by the Boat-bills seems another mark of relationship with the Night Herons.

The plumage of the South American species is a delicate lavender-gray above, the upper mantle with a broad band of black extending a little way down its sides, the wing-quills hoary gray or whitish, and the lower back, rump, upper tail-coverts and tail hoary gray, while the crown and crest are blue-black, the forehead white, the sides of the face, throat, and chest white, becoming delicate lavender-gray along the sides, and the breast and abdomen dark cinnamon-rufous; the eyes are large and dark, the upper mandible dark brown, and the lower mandible clear yellow, while the feet are dull or dirty yellow. The Central American species (*C. zeledoni*) is similar to the other except that it is larger, the general coloration much darker and browner, the crest much shorter, and has the throat and breast pale vinous or light tawny.

Notwithstanding the fact that the Boat-bills are very widely distributed and have been known to science for upward of one hundred and fifty years, comparatively little appears to have been recorded concerning their life history. They appear to associate in small flocks or colonies and to frequent the mangrove swamps, being apparently nocturnal in their habits. Thus Salvin records finding the more northern species on the Cays of British Honduras and in Guatemala, skulking in the mangroves, and Mr. C. C. Nutting found them in similar situations in Costa Rica, while Dr. Richmond observed several colonies on the Rio Frio, Costa Rica. Mr. E. A. Goldman, who has seen them at a number of points in Central America, regards the Boat-bill as a stupid, dull bird, permitting one to approach within a dozen or fifteen feet, and when taking wing only flying for a few yards to skulk among the tangled undergrowth. The note is described as a harsh croak or squawk. The nest and eggs appear to be unknown.

Fig. 47. — Boat-bill, *Cochlearius cochlearius*.

As already hinted, even the casual observer would doubtless be struck at once by the strong — albeit somewhat superficial — resemblance between the members of the present family and the great African Shoe-bill, the sole tenant of the succeeding family; but when the structural characters are compared it is found to be rather a case of "converging analogy" than actual affinity. "At first sight," says Dr. Stejneger, "the Cochlearius seems to represent a pygmy Balæniceps, between the legs of which it can stand upright without bending its neck, but even the outward likeness between the two bills is, on nearer inspection, by no means so great as would appear at first sight." Although Professor

Parker argued for a distinct relationship between them, it is improbable that they could have been derived from a common ancestor, but on the other hand the points of agreement with the Night Heron (*Nycticorax*) are so numerous and important as to leave no doubt as to the direction we must look for affinity. In fact, some systematists, regarding the Boat bill as merely a Night Heron with an exaggerated bill, decline to accord it more than subgeneric rank under *Nycticorax*, but as Mr. Ridgway has shown, it has become modified and specialized in so many ways and so important features, besides the bill and the consequent alteration of the skull, that it seems well entitled to separate family rank.

THE SHOE-BILL

(Family *Balænicipitidæ*)

A very remarkable bird, indeed, is the great Shoe bill, or Whale-head of the Upper White Nile, and well entitled to be ranked as the sole representative of a family. This bird is about four feet in height, with very long legs, rather short neck and large head, which is provided at the back with a short, bushy crest; but the most marked feature is the immense, broad, flattened bill. This bill, which is eight inches or more in length, is concave in profile, with a ridge down the center of the upper mandible, which is prolonged at the tip into a nail or hook. The wings are long and broad, with the third and fourth quills longest; the tail is rather short and composed of twelve feathers. The general color of the plumage is ashy gray above, the mantle, scapulars, and wing coverts having a slight greenish gloss, and paler gray below, the feathers of the fore neck and breast each with a dark stripe along the center. The feet and legs are leaden black in color, and the iris sometimes pale yellowish or occasionally grayish white. But a single species (*Balæniceps rex*) is known.

The systematic position of the Shoe-bill has given rise to considerable discussion, though now it is pretty generally agreed that its closest affinity is with the Herons, with which it agrees in having powder-down patches on the rump; bare loral spaces, the right lobe of the liver largest, and the cæcum single. According to Parker, who was the first to describe the skeleton, "the nearest relations of *Balæniceps* are the South American Boat-bill and the little South African Umbrette (*Scopus umbretta*)," though Beddard is of the opinion that it "requires further study before its exact position can be determined."

According to Mr. John Petherick, who was one of the first to observe these remarkable birds in their native haunts, they are "seen in clusters of from a pair to perhaps one hundred together, mostly in the water, and when disturbed will fly low over its surface, and settle at no great distance; but if frightened and fired at, they rise in flocks high up in the air, and, after hovering and wheeling around, will settle on the highest trees, and as long as their disturbers are near will not return to the water. Their roosting place at night is, to the best of my belief, on the ground. Their food principally is fish and water-snakes, which they have been seen by my men to catch and devour. They will also feed on the

Fig. 48. — Shoe-bill, *Balæniceps rex*.

intestines of dead animals, the carcasses of which they easily rip open with the strong hook of the upper bill. The breeding time of the Balæniceps is in the rainy season during the months of July and August, and the spot chosen is in the reeds or high grass immediately on the water's edge, or on some small elevated and

dry spots entirely surrounded by water. The birds before laying scrape a hole in the earth, in which, without any lining of grass or feathers, the female deposits her eggs. As many as a dozen eggs have been found in the same nest." Mr. Petherick succeeded in hatching some of the eggs under fowls and reared the young, sending them alive to England.

THE HAMMER-HEAD, OR UMBRETTE

(Family *Scopidæ*)

Although a much smaller bird than the one last considered, — the Hammer-head is only about twenty inches in total length, — it is in many ways even more peculiar and interesting, since it combines, in quite a remarkable degree, characters that ally it to both Herons and Storks, — a Stork-like Heron, as it has been called. It differs from the true Herons in the absence of powder-down patches, the pectination of the middle claw, and in having ten instead of eleven primaries. It differs, on the other hand, from the Storks in having the Heron like vocal apparatus, while the skull, Mr. Beddard says, "is on the whole more Stork like than Heron-like, but it does not show any of the extreme modifications of the Stork type." There are numerous other structural features suggesting one or the other of these types, and it seems safe to assume that it is closely allied to the ancestral form whence the two groups have originated. Its nearest living relative is probably the Shoe-bill.

It is a bird not larger than a Night Heron, with a somewhat cylindrical body, a large head set on a short, thick neck, and a rather large, compressed bill which has a downward curve at the tip. In color the plumage is an almost uniform earthy brown (umber), whence of course the French name *Umbrette*. There is a slight gloss of bronzy purple above, especially on the wings and tail, while below it is more ashy brown. The head is very strongly crested, the long crest-feathers being usually borne horizontally, thus somewhat resembling a hammer and giving rise to its common name. The toes are rather long and slightly webbed at the base; the tail of twelve feathers is also moderately long.

The Hammer-head (*Scopus umbretta*), or Hammerkop, as it is called by the Boers, is widely distributed over tropical Africa, Arabia, and Madagascar, though nowhere very abundant. Andersson states that it is pretty generally diffused over Damara Land, where "it is generally observed singly or in pairs, and is of a fearless disposition, allowing a person to approach within range without difficulty." It is there often met with during the rainy season, but moves to permanent waters as the rain-pools dry up. Reichenow says it "is sociable only in a slight degree. It is usually found single except at the nest, in wooded districts, watching for fishes with its neck drawn in, or walking with measured steps in search of frogs, which, besides worms, snails, and insects, constitute its food. Its flight resembles that of the Ibises, neck and feet being carried straight out. Its voice is a harsh *quack*, similar to that of the Spoon-bill."

The nest of the Hammerkop is described as one of the most remarkable structures made by any African bird, being a huge, flattened, dome-shaped affair,

Fig. 49. — Hammer-head, or Umbrette, *Scopus umbretta*.

often six feet or more in diameter and containing at least a large cart-load of sticks. It is built on a rocky ledge or perhaps more frequently in some large tree, each nest being the work of a single pair, and made use of for many years, being repaired or added to as required. The nest, which is very strongly built,

is provided with a single, rather small entrance ingeniously placed on the most inaccessible side, while within it is neatly plastered with mud and more or less divided into compartments. The nest is made use of by the birds the year round, and not infrequently several nests are found within a short distance, Dr. Sharpe mentioning having seen six or eight within fifty yards. The eggs, three to five in number, are pure white, and small for the size of the bird. Both sexes appear to take part in the duties of incubation, and it is recorded that two and perhaps more broods are reared in a year. The Hammerkop has the habit, similar to that of the Australian Bower bird, of embellishing its dwelling with any glittering or bright-colored object, such as bits of crockery, buttons, bleached bones, etc.

THE STORKS, IBISES, AND SPOON-BILLS

(Suborder *Ciconiæ*)

The birds of this group resemble in a general way the Herons and their immediate allies, having relatively long legs and necks, but they are distinguished chiefly by structural characters, and we may only mention the absence of powder-down patches, and the hind toe elevated above the plane of the others, leaving the more complete characterization to be recorded under the description of the various groups. The suborder is divided into two superfamilies, the *Ciconiidæ*, or Storks and Wood Ibises, and the *Ibidæ*, which embraces the families *Ibididæ*, or true Ibises, and the *Plataleidæ*, or Spoon-bills.

THE STORKS

(Family *Ciconiidæ*)

The **Storks**, although very widely distributed and popularly quite well known, are a small group comprising less than twenty forms. They have what may be called plump bodies, rather long legs and short necks, and large, compressed, conical, sharp-pointed bills which may be either nearly straight, somewhat curved or open in the middle. The front toes are connected at the base by a web, but the middle claw is without the pectination found in the Herons, while the tarsus is covered with reticulated scales, and the leg bare well up to the thighs. The wings are large, for they are powerful flying birds, and when on the wing the neck is held straight forward, another feature in which they differ from Herons. The short rounded tail is composed of ten feathers. They are, of course, without the powder-downs.

Among a number of anatomical characters we may mention that "the syrinx has no intrinsic muscles, and the Storks are consequently deprived of voice, and the only sound they produce is a loud clatter, by beating their huge mandibles together." — Stejneger.

White Stork. — The true Storks (*Ciconia*) are confined to the Old World,

three species being recognized, of which the White Stork (*C. ciconia*) is by far the best known. This species, as its name suggests, is, with the exception of the black wing-coverts and quills, pure white throughout, set off by a dark red bill, reddish pink legs and feet, while the claws are black. The female is similar in dress to the male, though slightly smaller in size, while the young have the wing-coverts and quills brown; the total length is about forty-two inches.

This Stork is found in summer over most of Europe except at the north, and extends also into central Asia, retiring in winter to Africa and northern India. It does not breed at all points along its northern range, being, for example, an occasional visitor to the east coast of England, coming over from Holland and Germany, where it is common during the nesting season. It was formerly abundant in many parts of France, but constant molestation has made it simply a bird of passage there. It has long been associated with man and seeks rather than shuns human habitations, and hence usually selects a chimney or building for the nesting site, or if these be unavailable, it may resort to rocks or trees. The nest, of sticks and reeds, is at first a shallow affair, but as the birds return year after year to the same place, it finally comes to be several feet high. Boxes are often placed for them to use as nesting places, and it is looked upon as a piece of great good fortune to the household to have the box occupied. The eggs, usually from three to five in number, are pure white. The Storks frequent marshes, where they feed on eels, frogs, lizards, snakes, young birds, small mammals, and insects, and are in some countries protected by law, on account of their value in keeping down reptiles, removing offal, etc. They arrive in the spring and depart in the fall in flocks of immense size, and while on the migrations usually fly at a great height, and

FIG. 50. — White Stork, *Ciconia ciconia.*

always arrange themselves in V shaped lines, the leader of which is constantly changing.

Japanese Stork. — Very similar to this species is the Japanese Stork (*C. boyciana*) of eastern Siberia, Korea, and Japan, though it is much larger and has the bill horn black instead of red, and the spot around the eye vermilion-red instead of black.

Black Stork. The remaining species of the genus is the Black Stork (*C. nigra*), a smaller bird than the White, and quite different in habits. The plumage is black above, glossed for the most part with a metallic purple, and pure white below. The bill, orbital space, and gular pouch are coral red; the legs and feet red; and the iris brown. It is found from southern Europe to Mongolia and China, and south in winter over Africa and the Indian peninsula, being a rare straggler to England. The Black Stork avoids human habitations and makes its home in deep swamps, placing its often very large nest in tall forest trees. They lay usually four eggs, which are grayish white in color.

Maguari Stork. South America is the home of a fine species known as the Maguari Stork (*Euxenura maguari*). It is about forty inches in total length and has the plumage white, with the exception of the wings and upper tail-coverts, which are black. The naked spaces about the ear and the feet are red, while the bill is horn-color with a yellowish base. There is a very curious modification of the tail-feathers in this bird, a feature first correctly worked out by Mr. Ridgway. The tail is short and deeply forked, the feathers being very rigid, while the lower coverts are elongated, extending beyond the true tail, and stiffened so as to resemble the true tail-feathers.

The Maguari is found throughout South America, being especially abundant in Argentina, where, Mr. Hudson says, "it is a well known bird on the pampas, breeding in the marshes, and also wading for its food in the shallow water; but it is not nearly so aquatic as the Jabiru, and after the breeding season is over it is seen everywhere on the dry plains. Here these birds prey on mice, snakes, and toads, but also frequently visit the cultivated fields in quest of food. Where mice or frogs are exceptionally abundant on the pampas, the Storks often appear in large numbers, and at such times I have seen them congregating by hundreds in the evening beside the water; but in the daytime they scatter over the feeding ground, intent on their prey, with majestic Crane-like strides. To rise they give three long jumps before committing themselves to the air, and like all heavy flyers make a loud noise with their wings."

White-necked Stork. — Allied to the Maguari by the possession of the peculiar forked tail is the White-necked Stork (*Dissoura episcopus*), which ranges over tropical Africa, the Indo-Chinese countries, and through the Indian and Malay peninsulas to Celebes. It is mainly black above, and on the breast the feathers are glossed with metallic green and purple, while the nape, neck, throat, and abdomen are white.

Abdim's Stork. — Among the true Storks also we may mention Abdim's, or the White-bellied Stork (*Abdimia abdimii*), a native of tropical Africa and extending thence into Arabia and Spain. In general appearance it is quite

similar to the Black Stork, although smaller and with shorter legs, and possessing, moreover, a number of anatomical differences. The general color is black above, slightly glossed with steel-green and purple, the bend of the wing, the back, rump, and upper tail-coverts being white; the head, neck, and fore neck metallic green and purple, while the remainder of the under surface from the fore neck downward is white. The bill is horny green with a crimson tip, while the naked space around the ears, a spot in front of the eyes, nostrils, and throat are crimson; the legs are olive-green, and the feet and knees crimson. This species is exceedingly abundant in many parts of Africa, frequenting the vicinity of the villages during the breeding season, where it is venerated and protected much as is the White Stork in Europe. Andersson says: "This somewhat coarse but handsome Stork arrives in Damara Land during the rainy season, leaving it again on the approach of the dry. The more plentiful the rain, the more abundant the birds, the cause being simply the great abundance of food. This species feeds largely on locusts, but devours with equal gusto beetles of all kinds, many hundreds of which I have taken from the stomach of a single bird; it also devours small reptiles, water-rats, fish, and frogs, but appears to prefer locusts when these are to be had, chasing them over the ground as well as in the air." These birds usually nest in communities, placing the nests in trees, sometimes to the number of twenty or thirty in a single tree. The eggs are three or four, and small for the size of the bird.

Fig. 51. — Indian Adjutant, *Leptoptilus dubius.*

The **Adjutants**, or **Marabou Storks** (*Leptoptilus*), are the largest and at the same time the homeliest members of the whole group. They are from forty to sixty inches in length, with an enormous bill, a bare head and neck, and a curious pouch pendent from the chest. This pouch is popularly supposed to be a receptacle for food, but as a matter of fact it has no connection with the esophagus. Another feature of moment is afforded by the under tail-coverts, which are composed of beautiful, soft, downy plumes. The general color of the bird is ashy gray above, with a green reflection, and pure white below. These birds are true scavengers, feeding largely on carrion but also capturing living prey such as fish, tortoises, and snakes. In India it is a common sight to see them about the streets of the towns, unabashed by the presence of man or dog, and such is its value that it is protected by law in many places. After satisfying its hunger it seeks repose during the heat of the day, and may often be seen standing for hours with one foot drawn up under its body, or resting on the

whole leg, with the feet spread out in front in what appears a very awkward position. They build a large nest on rocky cliffs or occasionally in trees and lay from two to four oval, chalky white eggs. Three species are known, — the African Adjutant (*L. crumeniferus*), found throughout tropical Africa, the Indian Adjutant (*L. dubius*) of the Indian peninsula and Indo-Chinese countries, and *L. javanicus*, widely distributed in the Orient.

Fig. 52. — Jabiru, *Mycteria americana*.

Jabirus. — Allied to the Adjutants is the Jabiru (*Mycteria americana*) of continental tropical America, but also coming as far north as Texas. It is the largest of the American Storks, standing nearly five feet high, and has the entire plumage pure white, with the head and six inches of the neck covered with naked

black skin, from which arise two scarlet bands of loose skin which extend down to the chest. "When the bird is wounded or enraged, this loose red skin is said to swell out like a bladder, changing to an intensely fiery scarlet hue." It is said to nest on high trees, and to lay blue-green eggs.

Close to the last-mentioned species are two Old World forms that we have space to hardly more than mention. These are the Saddle-billed Stork, or Jabiru (*Ephippiorhynchus senegalensis*), of tropical Africa, which is characterized by a saddle-shaped black space in the middle of an otherwise scarlet bill, and the Black-necked Jabiru (*Xenorhynchus asiaticus*), of northern Australia, New Guinea, and the Indian and Malayan peninsulas. It is similar to the other, but is without the "saddle" across the bill.

Shell Storks. — The Open-bills, or Shell Storks (*Anastomus*), are among the smallest of the group, being only twenty-eight or thirty inches in length. They are known at once by the fact that the bill gapes widely toward the tip, leaving, as suggested by the name, an open space of considerable extent in the terminal half of the bill. It was supposed that this resulted from wearing away in the process of securing their food, but it has been asserted on good authority that the young birds exhibit the same feature, and hence it is structural. They live on shell-fish, such as fresh-water mollusks, whence of course their second name. Of the two species known, the Indian (*A. oscitans*) is pure white both above and below, with the exception of the wings and their primary coverts, and the feathers of the tail, which are black with purple and green reflections. The African species (*A. lamelligerus*) is largely black with metallic green and purple reflections, the feathers of the crown, throat, breast, and under parts with narrow horny tips. The Open-bills nest among the reeds in marshes or occasionally in trees, returning year after year to their old nesting sites.

Wood Ibises. — The last members of the family to be considered are the Wood Ibises, or Wood Storks. Although it seems now to be pretty definitely settled that their affinities are with the Storks, they form, nevertheless, a sort of connecting link between them and the Ibises. By many students the characters of the Wood Ibises are regarded of sufficient importance to entitle them to be ranked as a family or subfamily of equal value as that including the Storks, but it perhaps is best in the present instance to consider them as a well-marked group of the *Ciconiidæ*.

The Wood Ibises are large Stork-like birds, with long legs and a long neck and beak, the latter being thickened at the base, but much attenuated toward the tip, where it is turned downward, much as in the true Ibises. The legs are covered with small hexagonal scales, while the toes are long, very slender, and connected basally by a well-developed web. The plumage is compact above but rather loose below; the wings are long and broad, the second, third, and fourth quills being nearly equal in length, while the tail is short, or moderately long, and composed of twelve broad, strong feathers.

Only four species of Wood Ibises are known, these being separable into two genera, — *Tantalus*, which includes the single American species, and *Pseudotantalus*, which embraces the three Old World forms. In the first, the adult

has the whole head and upper half of the neck naked, the skin being hard and scurfy, while in the Old World species only the fore part of the head is naked, the hinder half, as well as the entire neck, being densely feathered. In *Tantalus*, however, the young birds have the head and neck feathered. In all the species the general color is white, in some tinged with pink or rosy, while the quills and tail are black or brownish. In young birds the mantle is usually darker.

The **American Wood Ibis** (*T. loculator*) is a curious bird in many respects. It is widely distributed over tropical and warm temperate America, extending north regularly to the Gulf States, lower Mississippi Valley, lower Colorado Valley, etc., and casually or in some instances regularly to New York, Illinois, Utah, and California. It is from thirty five to forty five inches in length and white in color, with the quills, secondaries, and tail glossy greenish black with purple and bronze reflections. In the breeding season the under wing-coverts are rosy pink. The bare portions of the head and neck are livid bluish; the bill yellowish; the legs blue, becoming blackish on the toes.

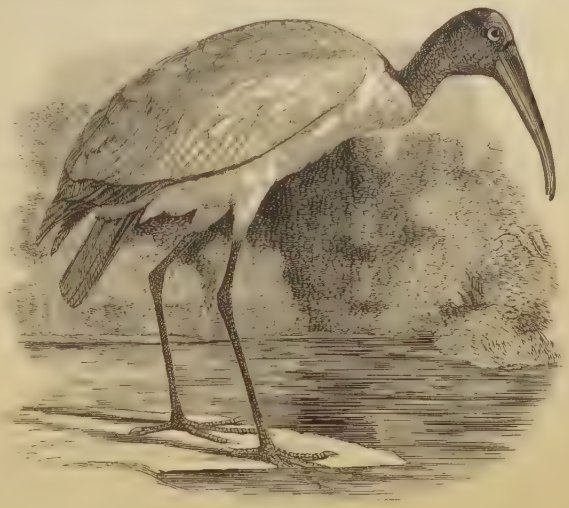


Fig. 53. — American Wood Ibis, *Tantalus loculator*.

Its habits have been variously described, some regarding it as a solitary bird, while others have found it usually in small parties. Hudson, who saw it in Argentina, says: "On the pampas it is not uncommon in summer and autumn, and goes in flocks of a dozen or twenty. The birds are usually seen standing motionless in groups or scattered about in spiritless attitudes, apparently dozing away the time." It frequents both fresh and salt waters, feeding largely upon fishes, which, according to Audubon, it catches by dancing around in the water to render it muddy, then killing all that come to the surface. It also feeds on frogs, crabs, snakes, turtles, young alligators, young birds, etc. The nest, a rude platform of sticks, is placed in trees often of great height. In the shallow depression two or three white eggs are laid, which are about two and one half by two inches. The nesting site is used for many years, the birds refusing to leave even under great persecution.

THE IBISES

(Family *Ibididæ*)

The Ibises are medium or large sized wading birds most closely related to the Storks, but distinguished from them at once by the bill, which is rather slender, more or less cylindrical throughout, and evenly bent downward after the manner of the Curlews. The bill is also rather soft, except at the tip, and the nostrils are slit-like, and placed in a deep, narrow groove which extends quite to the end of the bill. The legs are thick and strong, of moderate length, and the toes long, the front ones being connected by a short web, while the claws are long and slender. The wings are rather long and pointed, and the tail, of twelve feathers, is short and square-cut at the end. As Ridgway has said, "A great diversity of form and plumage is to be seen among the various species, some being trim and graceful in their build, and others uncouth, with Vulture-like head and neck, — some plain in colors, while others are among the most brilliant of birds."

The Ibises enjoy a wide geographical distribution, although most abundant in the intertropical regions. They are also a very old group, as some three or four fossil forms have been described from the middle Tertiary of England, France, Patagonia, etc. About thirty living species are known, these being distributed among some twenty or more genera. The New World is the richest in forms, possessing more than a third of the known species, while of the Old World species Africa possesses six or seven, Asia about eight, and Madagascar and Australia two each.

Sacred Ibis. — The oldest known, and in many respects the most interesting and the one about which clusters so much of ancient history and mythology, is, of course, the Sacred Ibis (*Ibis æthiopica*) of the Egyptians. As it was the "emblem of Shott, the scribe or secretary of Osiris, whose duty it is to write down and recount the deeds of the deceased," it is constantly to be seen carved in various forms on the ancient monuments, and its mummified bodies are found abundantly within the temples. It is about twenty-five inches in length, and has the entire head and throat bare and black in color. The plumage is pure white above and below, the secondaries being loose, dependent, ornamental plumes, with purple edges. Although once undoubtedly abundant in Egypt, it is now so rare that there has been expressed doubt if it was really entitled to be ranked as a native of that country. It is a native of Africa generally, especially the Nile basin, and follows down as the river rises, arriving in Egypt about midsummer, and retiring before winter, the season in which most Europeans visit the country, hence thought by them to be absent.

Closely allied to the Sacred Ibis is Bernier's Ibis (*I. bernieri*) of Madagascar, a smaller bird, with a less extent of naked space on the neck and ashy instead of purple-edged plumes. Still another related species, the Black-headed Ibis (*I. melanocephala*), is found in India and near-by countries, and this gives place to the Australian White Ibis (*I. molucca*).

Fig. 54. — Sacred Ibis, *Ibis æthiopica*.

Scarlet Ibis. — Beyond doubt the most beautiful of all the Ibises is the magnificent Scarlet Ibis (*Guara rubra*) of the eastern coasts of tropical America, whence it ranges north casually, or once did, to Florida, Louisiana, and Texas, though Mr. Ridgway doubts if any of the United States records are valid. It is from twenty-eight to thirty inches in length and is a uniform, pure, intense scarlet, except the tips of the longer wing-quills, which are a glossy blue-black. Mr. Ridgway says: "The scarlet color of this splendid bird is probably not exceeded in purity and intensity. It is, in fact, the very perfection of that color. It far surpasses the red of any Passerine bird known to us, even the plumage of the Scarlet Tanager appearing dull and harsh beside it." The Scarlet Ibis is an exceedingly rare bird in the United States and it is very doubtful if it ever nested there. It is, or was once, a not uncommon visitor to Jamaica and Trinidad, where it perhaps bred, but hardly does so now. In British Guiana and on the Rio Negro it is said to be abundant, but its brilliant plumage is so much sought after that it yearly decreases in numbers and may soon become totally extinct. It is said to frequent river banks and swampy places and to feed on worms, soft mollusks, and, perhaps rarely, fishes. The eggs, two and ten hundredths by one and forty-five hundredths inches, are grayish white, thinly marked with small blotches of light brown.

White Ibis. - Almost the exact counterpart of the Scarlet Ibis, except as regards color, is the White Ibis (*G. alba*), which has the plumage pure white throughout instead of scarlet, and the tips of the quills glossy greenish black instead of blue-black. Its center of distribution is tropical America, extending north, regularly, to North Carolina, southern Indiana, southern Illinois, and Lower California, while in winter it is found from the Gulf southward. The White Ibis is locally abundant at many points along the coast, where they are seen in flocks of six or eight to many hundreds. They apparently prefer fresh-water regions, especially during the breeding season, but are not infrequently found associated with various Herons, Pelicans, Cormorants, etc., along brackish water lagoons. They nest in communities often of vast extent, placing the nests in trees, bushes, and reedy marshes, Audubon recording the presence of forty-seven of their nests in a wild-plum tree near Cape Sable, Florida, while Scott found them in great abundance on Lake Butler, as well as at other points in Florida, stating that the nests are similar to those of the smaller Herons, "except that they were lined with leaves and were more carefully built." Four eggs is the usual complement, these being pale greenish white spotted with chocolate-brown, especially at the larger end, and averaging two and twenty-five hundredths by one and fifty hundredths inches.

Straw-necked Ibis. — One of the most remarkable and interesting members of the group is the Straw-necked Ibis (*Carphibis spinicollis*), which ranges over the whole of Australia and Tasmania as well as portions of New Guinea, and takes its common name from the presence on the sides of the fore neck of peculiar long, straw-like and straw-colored plumes. About thirty inches long, this bird has the bare portions of the head and neck dull inky black, while the back and sides of the neck are clothed with a white down. The general color of the

plumage above is black, glossed with shining bronzy green and purple, and covered with numerous bars of dull black, while the breast, abdomen, and tail are pure white. This splendid Ibis appears to be generally, though somewhat erratically, distributed over the whole of this immense territory, being present in a locality in countless thousands one year and entirely absent the next and perhaps for half a dozen years, its coming depending on the abundance of animal food. It inhabits the open downs and flats, particularly such as are studded with shallow lagoons, through which it wades knee-deep in search of mollusks, frogs, newts, and insects, and it also feeds on grasshoppers and insects generally. It "walks over the surface of the ground in a stately manner," says Gould, "perches readily on trees, and its flight is both singular and striking, particularly when large flocks are passing over the plains, at one moment showing their white breasts and at the next, by a change in their position, exhibiting their dark-colored back and snowy white tails." The note is described as a loud, hoarse, croaking sound, which may be heard at a considerable distance. The Straw-necked Ibis nests in colonies, often of vast size, one recently visited by Mr. D. Le Souëf in Riverina, New South Wales, in a swamp about four hundred acres in extent, being estimated to contain fully 100,000 birds. The nests were placed on low bushes, which were trampled down by the birds "into rough platforms to within six or nine inches of the water, whereon they constructed green twig nests about six inches across by two inches deep." The nests, which are mostly unlined, number from a dozen to thirty to each clump of bushes, while the eggs, from three to five in number, are dull white, of coarse texture and pitted surface.

Glossy Ibis. — The only other species we shall have space to mention is the Glossy Ibis (*Plegadis autumnalis*) and its closely related forms. This bird, found throughout the warmer parts of the Eastern Hemisphere and the southern portions of the eastern United States and the West Indies, is about twenty-four inches in length, and has the neck, back, lesser wing-coverts, and under parts a rich chestnut color. The feathers about the base of the bill are blackish, the bill blackish, and the legs greenish or dusky, points which distinguish it from the White-faced Glossy Ibis (*P. guarauna*), in which these feathers are white, the bill dusky red, and legs dull lake-red. This latter species is found throughout tropical America in general and western North America. The eggs of these species are a plain greenish blue, but their habits are otherwise similar to those of the other species described.

THE SPOON-BILLS

(Family *Plataleidæ*)

Although structurally similar to the Ibises, the Spoon-bills are at once distinguished by the form of the bill, this being nearly straight, flattened, narrow in the middle, then expanded out into a broad, spoon-shaped extremity. The head is partially or entirely bare, and the nostrils longitudinal in grooves, which extend with more or less distinctness to the apex of the bill. The wings are large,

reaching to about the end of the tail, which is short, even, and composed of twelve broad, rounded feathers. The plumage (except in *Ajaja ajaja*) is white throughout, often with a beautiful rosy or crimson tinge, and during the breeding season several of the species are ornamented with crests, or bunches of plumes on the breast or fore neck.

Roseate Spoon-bill. — The Spoon-bills are nearly cosmopolitan in distribution, and are divided into three genera and about six species, of which the Roseate Spoon-bill (*Ajaja ajaja*) is the only American representative. It is a handsome bird about thirty-two inches long, and is distinguished from the Old World forms by having the head and throat bare. The neck and upper back are white, with the rest of the plumage pink, becoming carmine on the lesser wing-coverts and upper and under tail-coverts; it is without crest or ornamental plumes. In the immature bird the head and throat are feathered and the plumage is more inclined to pink. The Roseate Spoon-bill is found throughout tropical and subtropical America, north to the Gulf States, having been formerly abundant in Florida, but the persecutions of plume hunters have so nearly exterminated it that during four winters recently spent in various parts of the state, Mr. Chapman did not observe a single specimen. It is, however, still to be found in comparative abundance on the Texas coast. They frequent the muddy or marshy borders of estuaries, mouths of rivers, and the salt-water bayous, having the general habits of Herons, "but feeding by immersing the bill and swinging it from side to side in their search for food." The Spoon-bills are gregarious at all seasons, but especially so during the nesting period, when they congregate in vast numbers, returning season after season to the same locality. The nest is a platform of sticks placed in bushes or low trees, and the eggs are three to five in number, white, spotted and blotched with various shades of olive-brown. They average about two and one half by one and three quarters inches.

The **White Spoon-bill** (*Platalea leucorodia*) is a slightly larger bird than the American species, and, with the exception of a band of cinnamon-buff on the fore neck, is pure white throughout, with a large nuchal crest of drooping, pointed plumes. It is found throughout central and southern Europe, thence east to central Asia and China, and south to northern Africa and India. It is said to breed among reeds in marshes after the manner of certain Cormorants. The other species of the genus are the Black-billed Spoon-bill (*P. regia*) of Australia and the Moluccas, the African Spoon-bill (*P. alba*) of tropical Africa and Madagascar, and the Lesser Spoon-bill (*P. minor*) of Japan and China.

The Yellow-legged Spoon-bill (*Platibis flavipes*) is confined to Australia, and is a large bird, mainly white above and below, but with the fore neck straw-colored, and the forehead, upper throat, and bill yellow.

ROSEATE SPOONBILL
(*Ajaia ajaja*)

THE FLAMINGOS

(Suborder *Phœnicopteri*)

Very peculiar birds indeed are these we shall now consider, having a rosy or bright scarlet plumage, extraordinarily long legs and neck, and a large bill that is bent abruptly downward in the middle as though deformed. Associated with these obvious characters are other more or less anomalous features which have rendered their systematic position subject to not a little difference of opinion. Some authorities, as for example Garrod, have placed them among the gallinaceous birds, while others associated them with the *Anseres*, or Ducks and Geese, and still others incline to the view expressed by Huxley, who says that the group is "so completely intermediate between the *Anseres* on the one side, and the Storks and Herons on the other, that it can be ranged with neither." Shufeldt, who has very recently studied the osteology of the group, agrees entirely with Huxley, but Gadow, whom we are following, as well as Beddard and others, regards the points of agreement between the Flamingos and the Storks and Ibises as on the whole more numerous than with Ducks and Geese, and consequently ranges them as a suborder of the Stork-like birds (*Ciconiiformes*), which is immediately followed by the order containing the Ducks, Geese, etc. It appears that more complete knowledge of their ancestors and life will be necessary before their position can be absolutely fixed. In any event it is beyond question that the Flamingos are a very ancient group, since nearly three times as many fossil forms are known as have been recognized as now living. The oldest of these fossil forms comes from the upper Cretaceous of Denmark; the others are mainly from the middle and late Tertiary of Europe, with a single Pliocene form (*Phœnicopterus copei*) from central Oregon, which is very closely allied to our living species (*P. ruber*).

Although long legs and necks are a prominent feature among the Herons, Storks, Ibises, etc., none of them makes such peculiar use of these members as the Flamingos are reputed to do. The long neck of the Flamingo is not produced by an excessive multiplication of vertebræ, for there are only eighteen, but by the great lengthening of the individual bones. The form of the bill is unique among birds. Stejneger well describes the lower mandible as "a deep and broad box, into which the upper one, which is much lower and narrower, fits like a lid; the sides are provided with quite Duck-like lamellæ; and, to complete the oddness of the structure, both mandibles at the middle are bent abruptly downwards." In feeding the Flamingos reverse the usual position of the head until the bent portion of the bill is parallel with the surface of the ground, thus working backward instead of forward as in other birds. They frequent shallow, preferably salt-water, marshes and lagoons, and their food consists of small mollusks, crustaceans, and vegetable matter, which they secure by exploring around in the soft mud much after the manner of Ducks, the water running out between the ridges of the bill. Hudson, who saw them in Patagonia, says that while feeding "the noise made by their beaks was continuous and resembled

the sound produced by wringing out a wet cloth. They feed a great deal by day, but more, I think, by night." Scott, who observed a large flock, estimated at one thousand birds, near Cape Sable, Florida, found them feeding by day; they were there stretched out in a long line, sometimes in a single but as often in double rank. This line varied in length at different times, sometimes being fully a mile long. He also notes that "all the time the birds were feeding there were three small parties, varying from two to five individuals, that were apparently doing a sort of picket duty." About every half hour the pickets were relieved by others, so that there were always a dozen or so on guard, and he found it impossible to approach within shooting distance. The nesting site of this flock Scott was not able to discover, but it was presumably not far from where he found them.

Flamingos are gregarious at all seasons, and especially during the breeding period. Mr. F. M. Chapman recently visited a colony on Andros Island in the Bahamas. The locality where they were found is described as "only a few inches above sea level and is characterized by wide stretches of shallow lagoons bordered by red mangrove trees with occasional bare bars of gray marl. . . . Subsequent research showed that the locality was regularly frequented by these birds as a breeding resort, but that apparently a different spot was chosen each year. Eight groups or villages of nests were found within a radius of a mile, each evidently having been occupied but one year. The largest of these, placed on a mud-bar only an inch or two above the level of the surrounding water, was one hundred yards in length and averaged about thirty yards in width. An estimate, based on an actual count of a portion of this colony, gave a total of 2000 nests for an area of, approximately, only 27,000 square feet." The nests, which were made of mud scooped up on the spot, were about fifteen or eighteen inches in diameter at the base and some twelve or thirteen at the top, and were from nine to twelve inches in height. Other observers describe the height of the nests as only a few inches, while the extreme of eighteen inches has been reported. The height of the nest appears rather to depend upon the depth of the water it is necessary to avoid. The eggs, one or two in number, are pure white and some three and one half by two inches. The manner in which the birds "sit" while incubating has been the subject of much discussion. It was formerly asserted that the long legs were permitted to hang down on either side of the nest, but it seems now to be definitely settled that such is not the case. Thus Mr. Abel Chapman, who found the European species nesting at the mouth of the Guadalquiver in Spain, distinctly states that they have "their long legs doubled under their bodies, the knees projecting as far as beyond the tail, and their graceful necks neatly coiled away among their back feathers, like a sitting Swan, with their heads resting on their breasts." This position has also been recorded for the American species by Mr. C. J. Maynard, who visited nesting places in the Bahamas, where among hundreds of sitting birds "not one had its legs hanging down."

As might be supposed, a flock of Flamingos, numbering as it often does hundreds or even thousands and tens of thousands of individuals, presents a truly

Fig. 55. — American Flamingo, *Phœnicopterus ruber*, nesting in the Bahamas. (Courtesy of the American Museum of Natural History.)

imposing spectacle, the long files vividly suggesting a company of scarlet-coated soldiers. When migrating or when forced by alarm to take flight, they still hold to the long lines or V-shaped parties. "If the color on the water was novel," says Scott, "that of a flock while in the air was truly surprising, a cloud of flame-colored pink, like the hues of a brilliant sunset." Hume, who saw them on the lakes of Sind, says that "to see one of these enormous flocks rise suddenly when alarmed is a wonderful spectacle; as you approach them, so long as they remain on the water at rest, they look simply like a mass of faintly rosy snow. A rifle is fired, and then the exposure of the upper and under coverts of the wing turns the mass into a gigantic, brilliantly rosy scarf, waving to and fro in mighty folds as it floats away."

On Lake Hannington, in the eastern province of the Uganda Protectorate, Sir Harry Johnston states that "it is no exaggeration to say that there must be close upon a million Flamingos (*P. minor*). These birds breed on a flat plain of mud about a mile broad at the north end of the lake, where their nests, in the form of little mounds of mud, appear like innumerable mud-hills. The birds, having hitherto been entirely unmolested by man, are quite tame. The adult bird has a body of rosy pink, the color of sunset clouds. The beak is scarlet and purple; the legs deep rose-pink inclining to scarlet. Apparently the mature plumage is not reached until the birds are about three years old. The young Flamingos very soon attain the same size as the rosy adults; but their plumage, when they are full grown, is first gray-white and then the color of a pale tea-rose, before it attains its full sunset glory. On the north coast of the lake the belt of Flamingos must be nearly a mile broad from the edge of the lake outward. Seen from above, this mass of birds on its shoreward side is gray-white, then becomes white in the middle, and has a lakeward ring of the most exquisite rose-pink, the reason being that the birds on the outer edge of the semicircle are the young ones, while those farthest out in the lake are the oldest. It is not an easy matter to make the birds take to flight. When they do so suddenly and the shallow water is disturbed, the stench which arises is sickening. The noise from these birds can be heard for nearly a mile. The *kronk, kronk, kronk,* of the million, mingled with the hissings, squitterings, and splashings and the swish-swish-swish of those who are starting in flight, combine to make a tumult of sound in the presence of which one has to shout to one's companion to be heard. It is curious to watch the ungainly motions of these birds when they wish to rise in the air. Their flight has to be preceded by an absurd gallop through the mud before they can lift themselves on their wings."

CHAPTER XIX

THE GOOSE-LIKE BIRDS

(Order *Anseriformes*)

IN the vast majority of cases the relatively close resemblance between the Ducks, Geese, Swans, etc., is so plainly a mark of kinship that there is usually no question in associating them, but it is found, as already abundantly indicated in other groups, that where a more intimate study is made, certain members of the group show more or less marked divergences from what may be assumed to be the typical form. The question of the probable origin of the group as a whole, as well as that of its various members, has to be considered, and this of necessity leads to the employment of characters quite apart from mere external appearance. As in the order last reviewed, it has been found necessary to include birds that are very different from the central or typical form on account of their agreement in anatomical structure. The *Anseriformes* may be defined as lamellirostral swimming birds, with short legs and the front toes fully webbed, or else wading birds, with a short decurved bill and enormously developed feet. They agree with the Storks in having the bridge or band form of palate (desmognathous), but differ from them in having the basipterygoid processes, two pairs of tracheosternal muscles, and well-developed functional cæca. The young are "precocious," that is, are able to swim or run about within a few hours after they are hatched, and are entirely covered with down. The combination of the last-mentioned characters with the bridged palate serves to separate them from all other birds, except possibly the Flamingos.

The order is divided into two suborders, the *Palamedeæ*, or Screamers, and the *Anseres*, or Geese, Swans, Ducks, and their allies. Each embraces a single family, although the *Anseres* may be conveniently grouped into a number of fairly well marked subfamilies.

THE SCREAMERS

(Suborder *Palamedæ* and Family *Palamedeidæ*)

These are birds about the size of a small domestic Turkey, with a small head and a rather fowl-like bill. The legs are of moderate length, but very thick and strong, and naked for a considerable distance above the ankle joint; the toes are very long, the third and fourth being connected at base by a short membrane.

The wings are large, broad, and rounded, with the third quill longest, and each wing is provided on the carpal portion with two curious, powerful spurs, the front one being much the larger. The plumage is composed of rather soft feathers, especially on the neck; the tail, of fourteen or twelve feathers, is broad and nearly half as long as the wings. The Screamers possess, also, a number of other marked peculiarities, the principal one being the absence of uncinate processes to the ribs, a condition not known in any other living birds, and suggesting at

Fig. 56. — Horned Screamer, *Palamedea cornuta*.

once the reptiles. The bones of the skeleton are very highly pneumatic, and the skin and underlying tissue to the depth of nearly half an inch is so completely filled with minute air spaces that it produces a crackling sound when pressed. According to Newton, the Screamers share with the Penguins the distinction of having the body continuously feathered, that is, without apteria, but other observers record the presence of a small bare space under each wing.

There has been much discussion as to the systematic position of the Screamers, and even now it can hardly be regarded as definitely settled. Some would regard their characters as of sufficient importance to entitle them to ordinal rank, but, all things considered, it seems least inconvenient to consider them as an aberrant

family of the present order. They number but three species, which are placed in two well-marked genera; all are natives of South America.

The Horned Screamer (*Palamedea cornuta*), so named from the presence on the forehead of a slender, forward curving "horn" or caruncle, some five or six inches long, is a native of Guiana, Venezuela, Amazonia, and Ecuador. It is about thirty-four inches in length and is glossy black above and mainly white below, the feathers of the head edged with whitish and those of the front of the neck and the sides with ashy; the legs and feet are ashy gray and the iris bright orange. It has a powerful voice, described as a loud and sudden hoot, but not by any means so remarkable as that of the Crested Screamer (*Chauna cristata*), the species we shall next consider. In this the plumage is slaty gray above, darker on the back, and white below, the chin, neck, and cheeks also whitish; the feet are red. The total length of the bird is about thirty-two inches. It is without the "horn" of the first species, but in its place the head is crested.

The Crested Screamer, or Chajá,[1] as it is called in imitation of its cry, inhabits the marshes, lagoons, and level open country abounding in water and succulent grasses of southern Brazil, Paraguay, and La Plata, where according to Mr. W. H. Hudson it is often seen in thousands. "It is," he says, "partially aquatic in its habits; and in desert places it is usually seen in marshes, wading in the shallow water, and occasionally swimming to feed on the seeds and succulent leaves of water-loving plants." It also feeds upon the forage plants that have been introduced since the European occupation of the country, being especially fond of clover. Notwithstanding the presence of its powerful wing-spurs it seems to be a very even-tempered and peaceful bird, rarely or never quarreling. Its voice is a marked feature. To quote again from Mr. Hudson, who says on this point: "The voice is very powerful. When disturbed, or when the nest is approached, both birds utter at intervals a loud alarm-cry, resembling in sound the anger-cry of the Peacock, but twice as loud. At other times its voice is exercised in a kind of singing performance, in which male and female join, and which produces the effect of harmony. The male begins, the female takes up her part, and then with marvelous strength and spirit they pour forth a torrent of strangely contrasted sounds, — some bassoon-like in their depth and volume, some like drum-beats, and others long, clear, and ringing. It is the loudest animal sound of the pampas, and its jubilant martial character strongly affects the mind in that silent melancholy wilderness." They are said to sing at all seasons of the year and often at all hours of the night, and when congregated in flocks they often sing in concert.

The nest is a large though light structure of dry rushes, placed among low rushes and water lilies and not infrequently is seen floating away from its moorings. The eggs are usually five, pure white, and about the size of those of the domesticated Goose.

The remaining species (*Chauna chavaria*), the Derbian Screamer, is a native of Venezuela and Colombia. It is a smaller bird than the others, being about twenty-eight inches in length, with the plumage slaty black, the upper parts glossy and the lower parts paler, the cheeks and throat white, set off sharply from a black collar.

[1] Pronounced *Cha-há.*

THE SWANS, GEESE, DUCKS, AND MERGANSERS

(Suborder *Anseres*, Family *Anatidæ*)

The members of this large assemblage are, with possibly slight exception, so typically "Duck-like" in appearance that there can usually be no difficulty in their recognition. They are all aquatic or semi-aquatic in their habits, and, with a single exception, — the Pied Goose of Australia, — all have webbed feet. With limited exceptions, such as the Steamer Duck of South America and a few others, all the members of the group are good, not to say strong, flyers. The bill is generally broad and flattened, with the edges laminated, although in several groups it becomes narrower and more or less tapering to a point; in all, however, the upper mandible terminates in a nail. The legs are short and usually placed far back on the body, an adaptation which permits rapid movement through the water. The plumage is close and compact, and there are relatively few bare spaces. It is perhaps unnecessary to go into the anatomical characters, at least beyond those set forth on the preceding pages, as certain of the more important details of structure will be taken up under the various groups. It may be stated, however, that when the moult takes place the feathers of the wing are generally shed at once, thus incapacitating them for flight for a short period.

The *Anseres* number about seventy living genera and two hundred and ten species, and are cosmopolitan in distribution, though most abundant in the more northern portions of the Western Hemisphere. Several genera and a large number of fossil forms have been described, yet none of them is of very great antiquity. The members of this group are all more or less sociable, and may often be seen feeding in flocks, and during the breeding season often nest in proximity, though not in such colonies as characterize, for example, the group last considered. Most of them are strongly migratory and while on these journeys to and from the summer home often fly in single file or V-shaped formation, under the direction of an apparently competent and trusted leader. The nests are usually placed on the ground, occasionally in hollow trees, and the complement of eggs is usually large, ranging from some four or five to a dozen or more. These have hard, generally smooth shells and are even or uniform in coloration.

Swans. — The first forms we shall consider are the Swans (Subfamily *Cygninæ*), which may be characterized by the very long neck, this being as long as or even longer than the body. The number of vertebræ entering into the neck are from twenty-three to twenty-five, whereas in the remainder of the *Anseres* the number is less than twenty. They are large, markedly aquatic birds and their compact bodies and gracefully curved necks make them models of grace and beauty on the water. They number about eight species, disposed in two genera, though upon this latter point authorities differ. The true Swans may be referred for convenience to the genus *Cygnus*, notwithstanding the fact that it is sometimes divided into two or more. With two exceptions the plumage is pure white throughout, although the head is often stained with

rusty. They are mainly natives of the Northern Hemisphere, North America laying claim to two of the finest species.

The **Trumpeter Swan** (*C. buccinator*) takes its name from its peculiar, loud and raucous voice, which is apparently made possible by the convolutions of the windpipe within the breast-bone, which is hollowed out to contain it, suggesting in this respect certain of the Cranes. It is a bird between five and five and one half feet long and has an extent of wings of from eight to ten feet. It is further distinguished by having the bill and lores entirely black, and by the fact that the distance from the eye to the nostril is not greater than from the

Fig. 57. — Trumpeter Swan, *Cygnus buccinator*.

nostril to the end of the bill. It is found chiefly in the interior of North America, breeding from the Dakotas and Iowa northward, being rare or less generally distributed toward the Pacific coast, and rare or occasional on the Atlantic coast. Although it may occasionally nest in the southern part of the range indicated above, it breeds mainly in the far North. MacFarlane mentions finding many nests in the Barren Grounds and on islands in Franklin Bay in the Arctic Ocean. They were composed of a quantity of hay, down, and feathers intermixed, and the complement of eggs was from four to six. They are a uniform chalky white color, and measure about four and one half by two and three fourths inches.

Whistling Swan. — The other North American species is the Whistling Swan (*C. columbianus*), a smaller bird than the last, being only about four

and one half feet long and with a spread of wings of about seven feet. The bill and lores are black, the latter marked with a yellow spot before the eyes, thus distinguishing it from the Trumpeter. Of the notes of this species, Dr. Brewer says: "It usually arrives at its regular feeding grounds at night, and signalizes its coming by loud and vociferous screaming, with which the shores ring for several hours. . . . When feeding, or dressing their plumage, this Swan is usually very noisy, and at night these clamors may be heard to a distance of several miles. Their notes are varied, some resembling the lower ones made by the common tin horn, others running through the various modulations of the notes of the clarionet. These differences are presumed to be dependent upon age." During the summer this bird may be found rearing its young on the shores of the Arctic Ocean, where Mr. MacFarlane found some thirty nests during his residence of several years in that inhospitable land in the interest of the Hudson Bay Company. The nests were all on the ground and were similar in appearance to those of the last species. The maximum number of eggs was five, these averaging about four by two and three fourths inches. In winter this Swan comes as far south as the Gulf of Mexico and was formerly found on the Chesapeake Bay, but it is now a very rare bird in the Eastern States. It occasionally wanders as far east as Scotland and has also been found in eastern Asia.

European Whistling Swan. — In the northern parts of the Eastern Hemisphere the place is taken by two species belonging to the same group as the American Swans, but they are distinguished at once by having the basal portion of the bill and the lores yellow. The larger of these is the Whooper or Whistling Swan of Europe (*C. musicus*), which has a total length of about five feet. It is " essentially an Arctic species, breeding chiefly within the Arctic Circle either on the islands in the deltas of the great rivers or on the lakes of the Siberian tundras." It also breeds in Iceland and the northern parts of Scandinavia, whence it retires in winter to central Asia, China, and Japan. A century ago it nested on the Orkneys, and even now is a not uncommon winter visitor to the British Islands. The nest is described as a bulky affair of sedge and coarse herbage, and the eggs, four or five in number, are pure white. Seebohm, who studied its habits in Siberia, says the notes of the Whooper resemble those of a bass trombone.

Bewick's Swan (*C. bewickii*) is a third smaller than the Whooper, and may be distinguished further by the black apical portion of the bill extending much above the nostrils. Its distribution and habits, so far as known, are similar to the last, except it is not found in Iceland and only occasionally in Scandinavia.

Mute Swan. — The Old World is the home also of the Mute Swan (*C. olor*), so named from the fact that in the domesticated or semi-domesticated state it is without voice, though in its purely wild state it is said by Naumann to have a loud, trumpet-like note, at least during the breeding season. It belongs to a different group from the species already described in possessing a prominent knob at the base of the bill, and in the absence of convolutions of the windpipe within the breast-bone. It is a large bird, often reaching a length of five feet,

and like the others is pure white. In the wild state it is found in summer from north and central Europe to central Asia, and in winter south to northern India and the Caspian and Mediterranean seas. It has apparently been in domestication in England since about the close of the twelfth century, and has now been taken throughout the world as an ornamental bird on lakes and ponds in parks and estates. There is a large swannery near Weymouth, England, which in 1880 numbered about 800 birds, where they breed freely and may possibly mix with the really wild birds which appear at intervals on the English coast.

Black-necked Swan. — The remaining member of this genus is the beautiful Black-necked Swan (*C. melanocoryphus*) of southern South America. It is about forty-eight inches in length and is pure white, except the head and upper two thirds of the neck, which are black with a velvet gloss, and there is also a narrow white stripe surrounding the eye and extending backward to the nape. The base of the bill and the knob are bright red, the remainder of the bill bluish. Mr. Hudson tells us that this species is very abundant on the pampas of Buenos Ayres and Patagonia, where it is seen about the watercourses in small flocks or occasionally in hundreds. They breed in July, the nest being "always placed among thick rushes growing in deep water. It is built up from the bottom of the swamp, sometimes through four or five feet of water, and rises a foot and a half above the surface. The top of the nest measures about two feet across, with a slight hollow for the eggs," which are three to five in number and cream-colored, with a smooth, glossy shell.

Black Swan. — The last of the Swans is the celebrated Black Swan (*Chenopis atrata*) of Australia. It is a smaller bird than some of the white species, being only about forty inches long, and is brownish black throughout, with the lower surface paler, and with the primaries and secondaries pure white. The bill is scarlet, crossed near the tip by a broad white band. Aside from the color, which of course serves to distinguish it at once, the inner wing-feathers and feathers between the shoulders are crisped or curled and raised. The neck is long and slender, and carried in a very graceful curve, which, with its comparative tameness, makes it one of the most attractive birds of the whole group.

Semi-palmated Goose. — We now pass to the consideration of the Geese, not, however, the more typical members, but first a few of the so-called outliers, beginning with the Semi-palmated Goose (*Anseranas semipalmata*) of Australia, which stands as the sole representative of a subfamily (*Anseranatinæ*). As the name implies, this bird has the toes only slightly webbed at the base, and in addition the hind toe is very long and on the same plane as the front ones. The plumage presents a pied but decidedly elegant appearance, the head, neck, mantle, wings, tail, and thighs being black, and the back, breast, abdomen, tail-coverts, and smaller wing-coverts white. The total length is about thirty-five inches. The habits of this Goose are peculiar in that it is not nearly so aquatic as most others, rarely visiting water, it is said, but spending hours perched on trees, for which its partially webbed feet especially

adapt it. Its walk, too, is quite un-Goose-like, resembling the stately tread of a typical wader, such as a Crane or Heron. Its cry is described as a loud, coarse whistling. The Semi-palmated Goose was formerly very abundant in the southern part of Australia, but advancing civilization has thrust it farther and farther back. It is readily domesticated.

Spur-winged Geese. — Quite closely related are the African Spur-winged Geese (*Plectropterus*), of which some four species, or well-marked geographical races, are recognized. They are quite large birds, being about thirty-eight inches long, and take their name from the presence of a stout spur on the bend of the wing. In two of the species the front of the head is provided with a high knob, but this appears to be a rather variable character. The plumage is metallic black above, with green and purple reflections, and, except for the black breast, is mainly white below. The legs are rather long and placed near the middle of the body. In the common species (*P. gambensis*) of West and East Africa, the frontal knob is rather small, this, together with the bare forehead and bill, being coral-red in color Similar, but larger, is Rüppell's Spur-winged Goose (*P. rüppelli*) of northeast and equatorial Africa, which has the highest frontal knob of any of the species. In southeast Africa the place is taken by the black species (*P. niger*), and in Shoa by the nearly knobless species (*P. scioanus*). The habits of the common species (*P. gambensis*) are described as follows by Mr. Thomas Ayres: "Sometimes they are very shy, and at others almost absurdly tame; as a rule it requires heavy shot to kill them. They come out early in the morning from the swamps and weeds to feed on grass seeds, and are often seen on the farmer's corn lands. As a rule they are gregarious, but are sometimes seen singly, and at other times in pairs; they breed away from water in thick, grassy or rushy spots, and lay a number of white eggs with thick, glossy shells."

Pygmy Geese. — Belonging to the same subfamily (*Plectropterinæ*), but very different in size and appearance from those last considered, are the curious little Dwarf or Pygmy Geese (*Nettopus*), of which four species are known, ranging from tropical Africa and Madagascar through India and Malacca to China and Australia. These diminutive Geese, for they are true Geese, are no larger than a small Green-winged Teal, the largest being only thirteen and one half inches in length, and the smallest but eleven and one half inches. The African species (*N. auritus*) is shining black-green above and mostly white below, with a white stripe along the wing, and the chest, flanks, and sides rufous, the first narrowly black barred. It is found in pairs or small flocks in the lagoons near the rivers and lakes and is rarely seen away from the water. The Indian species (*N. coromandelianus*), which may be known by the white neck and a broad black band across the breast, is said by Dr. Jerdon to nest "generally in holes in old trees, often at some distance from water, occasionally in ruined houses, temples, old chimneys, and the like, laying eight or ten — sometimes, it is stated, as many as fifteen — small white eggs." The Green Pygmy Goose (*N. pulchellus*) of Australia is reported by Gould to build a nest of dried grasses in shallow water, which, it appears, the Indian species may also occasionally do.

The **Cape Barren** or **Cereopsis Goose** (*Cereopsis novæ hollandiæ*) is another of the somewhat aberrant members of this family, well entitled to stand as the only living representative of a subfamily (*Cereopsinæ*). It is nearly three feet in total length, of massive build, with stout legs and feet, and a short, thick bill, nearly the whole of which is covered with a cere of a lemon yellow color. The plumage is brownish gray, becoming whitish on the crown of the head, and the feathers of the back and wing-coverts with a brownish black spot near the tips. The bill, except when it is covered with the cere, is black and the legs reddish orange. Gould states that this Goose was found to be very abundant by the early voyagers, and so tame that it could be knocked down with sticks or even taken in the hand; but as it is strictly a vegetable feeder, its flesh proved such excellent eating that it was soon almost exterminated, and sixty years ago it had become so scarce as to be rarely seen. It seems likely that it will ultimately share the fate of its near relative, the extinct *Cnemiornis*. The voice of the bird is described as a disagreeable deep, hoarse clanging, and the nest as a well-built affair lined with feathers and down. The eggs are creamy white in color and about three and one fourth by two and one fourth inches. It takes readily to confinement, but is very pugnacious, inflicting severe wounds with its powerful, sharp bill.

Cnemiornis. — In New Zealand there existed, apparently within a few hundred years, a large, flightless Goose (*Cnemiornis calcitrans*) that is nearest related to the Cereopsis Goose, although it was much larger and had a shorter, more massive skull, and a rounded, short beak. The wings were short and wholly useless for flight, and the breast-bone was without a keel. Its bones were found associated with those of the Moa, and it is presumed that the same agencies contributed to its extermination as those which brought about the disappearance of these birds.

True Geese. — The so-called true Geese are aggregated into a subfamily (*Anserinæ*), and number nine or ten genera and thirty or more species, but the limits of the group are not very satisfactorily fixed, and the lines separating certain of the genera are more or less arbitrary. They differ from the Swans in having a neck always shorter than the body, although it is longer than in most Ducks, and from most of the Ducks by having the front of the tarsus covered with small hexagonal instead of narrow scales, while they are distinguished from the last subfamily by the absence of a cere. They are birds of moderate size, with rather long legs, and although they swim well are also adapted for a terrestrial life, and being essentially vegetable feeders, are often seen away from water. They are almost cosmopolitan in distribution, but are most abundant in the Northern Hemisphere, rearing their young in many cases well within the Arctic Circle, and ranging south over wide areas in winter. They are all strong on the wing.

Coscoroba. — The first, and in some respects least typical, member of the group is the Coscoroba (*Coscoroba candida*), a large bird of southern South America. By some writers it is placed with the Swans, but, on the whole, it seems best located here, since in its structure, habits, "language," and flight it is decidedly more Goose-like. It is pure white, with the tips of the quills black,

and the bill and the legs bright rosy red. It is usually seen in small parties, though occasionally in flocks of several hundred individuals, and when disturbed has a "loud, musical, trumpeting cry in three notes." The nest, usually placed away from water, is built on the ground, of mud, weeds, and grasses, and the large, shining white eggs are eight or nine in number.

The typical Geese — the true Geese *par excellence* — belong, to the number of a dozen or more species, to the genus *Anser*, and are characterized by having the plumage brownish, the feathers of the back, etc., with lighter tips, and the lower parts pale brownish gray or grayish white, with the upper and under tail-coverts pure white. There is usually very little if any black on the head and the tail-feathers are sixteen in number. Only two forms are found in North America.

Gray-lag Goose. — The common species of western Europe is the Gray-lag Goose (*A. anser*), a bird about thirty-five inches in length, supposed to be the original from which the domestic breeds have sprung. It has the lower back almost gray in color and no conspicuous white on the forehead. The Gray-lag does not go as far north to breed as do many of the Geese, and is the only species nesting at the present time in Great Britain. Of its habits, Mr. Hudson says: "The Gray-lag Goose pairs for life, and is gregarious, but is said not to associate with Geese of other species. It feeds on grass and young shoots, and in autumn on grain, and spends nearly the whole day in feeding, and at dark resorts to some level open space to roost, where it is almost impossible to approach within gunshot of the flock, owing to its watchfulness. The Gray-lag makes a large nest of weeds and grass, lined with moss, and lays six eggs, sometimes a larger number. During incubation the gander keeps guard over his mate, and afterward assists her in rearing the young. These are led back to the nest every evening by the goose, and sleep under her wing." In Siberia the place is taken by a slightly larger form (*A. rubrirostris*), distinguished mainly by having the base of the upper mandible bright red. This bird spends the winter in northern India and southern China.

The **White-fronted Goose** (*A. albifrons*), a smaller species than the last, spends the summer in northern Europe and Siberia and possibly Greenland, and in winter comes to southern Europe, India, and China. It may be known by the white on the forehead and at the base of the upper mandible, and by the orange-yellow bill, legs, and feet. It is pretty generally distributed over the entire Arctic region of the Old World, breeding near the coast-line of the Arctic Ocean, and also on the larger rivers and bays. The American White-fronted or Laughing Goose (*A. albifrons gambeli*) is almost exactly similar to the Old World form except in size, being uniformly larger. It breeds in the high Arctic regions and in winter spreads over all the southern portions of North America, being, however, most abundant in the western and central portions and rare in the eastern. It has been found very abundantly along the Yukon, nesting in communities, and laying six to ten eggs in a depression in the sand without any kind of a nest or lining. Mr. MacFarlane, chief factor of the Hudson Bay Company, reports having taken about one hundred nests in Arctic America between the years 1861 and 1865. Like the nests along the Yukon, they were a mere cavity in the

ground, but in every instance that fell under his notice they were lined with hay, feathers, and down, and the number of eggs did not exceed seven.

Other Species. — We have hardly space to mention in detail the remaining species of this genus beyond stating that the Bean Goose (*A. fabalis*), a bird about the size of the Gray-lag, having the base, tip, and edges of the bill black, with the middle portion orange, is found in the breeding season in northern Russia and Lapland and in winter throughout Europe and northern Africa. It is usually abundant along the north coast of the British Islands in winter. Very similar is the Pink-footed Goose (*A. brachyrhynchus*), which differs in being smaller and having the legs, feet, and middle portion of the bill pink instead of orange. It nests in Spitzbergen and probably Franz Joseph Land, migrating in winter to northern Europe, being especially abundant at that season off the British Islands.

Snow or Blue Geese. — Closely allied to the forms just considered, and by some united with them, are the Snow or Blue Geese (*Chen*), of which four species are known, all found in, though not confined to, North America. They differ

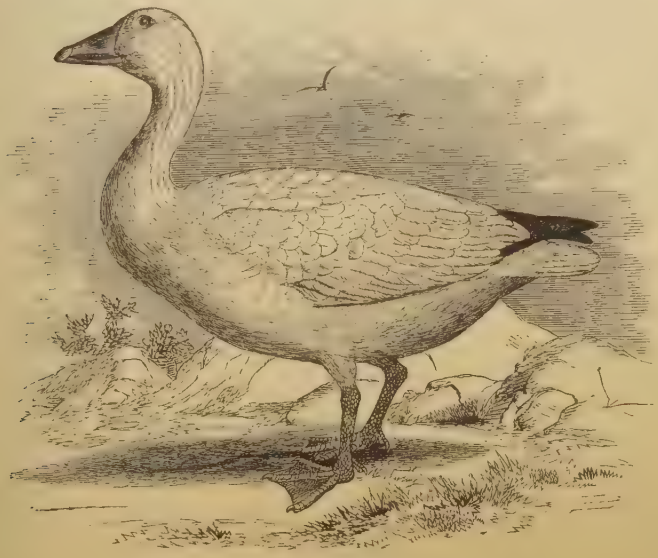


Fig. 58. — Lesser Snow Goose, *Chen hyperboreus*.

from them in having the bill stout, its depth through the base being equal to much more than half the length of the culmen; the color of the adults is white or bluish gray.

The Greater Snow Goose (*C. hyperboreus nivalis*) is the largest form, ranging from thirty to thirty-eight inches in length, and is uniform pure white

throughout, with the exception of the black primaries. Its breeding grounds are unknown, but are probably in the Arctic regions to the east of Mackenzie River; in winter is found from the Chesapeake Bay to Cuba, but is rare on the coast north of Virginia; very little is known of its habits. Similar but smaller is the Lesser Snow Goose (*C. hyperboreus*), which is only twenty-three to twenty-eight inches in length. It is found in western America, breeding in northern Alaska and migrating south in winter to southern California and along the Asiatic coast to Japan. Its habits are likewise but little known. The smallest species is Ross's Snow Goose (*C. rossii*), this being only twenty to twenty-six inches in total length, and otherwise differing from the two mentioned above by the smaller, weaker bill. It is found in the interior of Arctic America in summer and in winter migrates as far south as Montana on the east and southern California on the west. Its nests, eggs, and habits, as well, are practically unknown. The last species of the genus is the so-called Blue Goose (*C. cærulescens*), which may be known by the plumage being chiefly grayish brown, the rump and wing-coverts usually bluish gray. It was formerly thought to be the young of the Snow Goose, but it is now known to be a distinct species. It is found in eastern North America, spending the summer on the eastern shore of Hudson's Bay and migrating southward, chiefly in the interior, to Texas. The nest and eggs are not known.

Brent or Sea Geese. — Passing over a small number of relatively unimportant Old World forms, we come to the last members of this subfamily, namely, the Brent or Sea Geese (*Branta*). They have in general much the same form as those previously mentioned, but are distinguished by the darker plumage, the head and neck being mainly black, and the bill, legs, and feet entirely deep black at all ages. Of the eight or nine species and subspecies recognized all but one are found in North America, and of these the Canada Goose (*B. canadensis*) is by far the best known. It is a bird from thirty-five to forty-three inches long, with the back and wings grayish brown, the under parts grayish white, the head and neck black, with the throat and a large patch on the side of the head white. It is one of the most widely distributed of our birds, being found over nearly the entire temperate parts of the continent. It breeds mainly in the northern United States and the British Provinces, coming south in winter to the Middle and Southern States, and even to Mexico. It usually builds a nest of sticks, lined with down, this being placed on the ground in open country, or along the shores of rivers or lakes, or occasionally in trees, then utilizing an old nest of the Osprey or some other large bird. The eggs are usually four or five in number, buffy white, and about three and one half by two and one half inches. They usually migrate at night and their familiar *honk-honk* comes floating through the air with astonishing distinctness. They are strong, rather rapid flying birds, and when on the wing arrange themselves in V-shaped lines under the direction of a trusted leader, who avoids so far as possible all suspicious places. Occasionally they become confused on entering a bank of fog or the smoke overhanging a city and come close to the earth, when they not infrequently dash against monuments and lighthouses. They feed on aquatic plants, seeds, roots of sedges, etc., and when feeding in

companies always have sentinels out, who warn the flock at the first show of danger. They arrive from the south at their summer homes in flocks of varying size, and remain in company for some weeks, then break up into pairs and proceed to the business of rearing their young. After the nesting season is over the

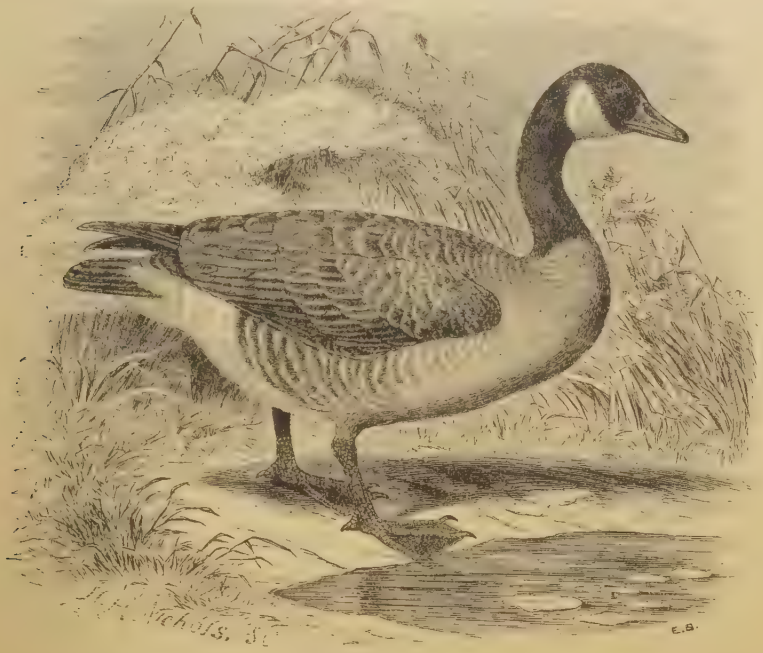


Fig. 59. — Canada Goose, *Branta canadensis*.

moult takes place, and being then unable to fly the birds are often destroyed in great numbers. They have been partially domesticated, but unless the wing is cut are liable to be allured by passing wild birds.

There are a number of well-marked subspecies, which are thought by some to be entitled to full specific rank, among them Hutchins's Goose (*B. c. hutchinsii*), which closely resembles the Canada Goose in color, but is uniformly smaller. It breeds in Arctic and sub-Arctic America, coming south in winter through the United States and northeastern Asia. The White-cheeked Goose (*B. c. occidentalis*) may be known by the very dark coloration, the size being about that of Hutchins's Goose. Its breeding grounds are on the northwest coast of North America, north to Sitka, and it comes south in winter to California. Similar but not much larger than a Mallard Duck is the Cackling Goose (*B. c. minima*), which is also found on the Pacific coast, chiefly about the lower Yukon and the shores of Norton Sound; in winter it visits California.

Barnacle Goose. — In western Europe this group is represented by the Barnacle Goose (*B. leucopsis*), which is so called on account of the curious belief which gained credence from the eleventh to the seventeenth centuries, that they were developed from barnacles. Thus Giraldus Cambrensis, writing in 1187, says: "There are here many birds which are called Bernacæ, which nature produces in a manner contrary to nature, and very wonderful. They are like marsh-geese, but smaller. They are produced from fir timber tossed about at sea, and are at first like eggs on it. Afterwards they hang down by their beaks, as if from a sea-weed attached to the wood, and are enclosed in shells that they may grow the more freely. Having thus, in course of time, been clothed with a strong covering of feathers, they either fall into the water, or seek their liberty in the air by flight. The embryo geese derive their growth and nutriment from the moisture of the wood or of the sea, in a secret and most marvelous manner. I have seen with my own eyes more than a thousand minute bodies of these birds hanging from one piece of timber on the shore, enclosed in shells, and already formed." Pages of testimony of a similar character might be quoted from Olaus Magnus, Sir John Maundeville, and many others.

The Barnacle Goose is about twenty-five inches in length and has the mantle bluish gray barred with black and gray, the wings and tail blackish, the lower parts white, and the head mostly white, with the lores, crown, neck, and chest black. It is found in Greenland, Iceland, Spitzbergen, and Nova Zembla, where it is supposed to breed, but its nest and eggs are unknown. It winters in northern Europe, coming occasionally to the east coast of North America.

The **Brant** or **Brant Goose** (*B. bernicla*) is found on the seacoast of eastern North America and western Europe, breeding only within the Arctic Circle. It is a little smaller than the last and has the upper parts brownish gray, the lower parts slate-gray, and the head entirely black, with a white patch on the sides of the neck. The American form, which is whiter below than the European, is a distinct subspecies (*B. glaucogaster*), though it also occurs in western Europe. The nest, placed on the ground, is composed of grasses, moss, etc., and is lined with down, and the eggs, smooth and creamy white in color, are usually four. Its habits are similar to those of its relatives, it being, however, rather less active than the Canada Goose, and not flying with the same precision or rapidity. The Black Brant (*B. nigricans*) is the western representative of the last species and may be known by the nearly complete white collar, and much darker under parts. The Brant Geese are present in the Southern Hemisphere, but as they differ more or less from those of the north they have been separated as a subfamily (*Chloëphaginæ*), but the characters are not very important and some writers place them all under the genus last considered. Of the six species found in southern South America, Mr. W. H. Hudson considers the Ashy-headed Goose (*Chloëphaga poliocephala*) as the handsomest. It has the head, neck, and scapulars grayish lead-color, the breast and upper back chestnut, banded with black, the abdomen, under wing-coverts, bend of the wing, and secondaries white, the primaries, lower back, tail, and wing-coverts black, the latter edged with shining green and tipped with white, and the under tail-coverts chestnut-rufous.

This bird spends the summer in Patagonia and in winter migrates northward to southern Argentina, appearing on the pampas in small flocks or occasionally in parties of one or two hundred. Other species are the Andean Goose (*C. melanoptera*), an inhabitant of the high Andes of Peru and Bolivia and the central provinces of Chile, coming down to the plains in winter; the Upland Goose (*C. magellanica*) of the Falkland Islands and Patagonia, and the Barred Upland Goose (*C. inornata*), a northern form of the last, found in Chile and Argentina.

Maned Goose. — The account of the Geese may be closed with a brief mention of the handsome Maned Goose (*Chenonetta jubata*) of Australia, which is so named from the presence of lengthened black plumes on the back of the neck. It is only about twenty inches long and has the plumage a mixture of velvety black, gray, white, and glossy green. It usually nests in hollow trees, often at a distance from water, and feeds on grasses, aquatic plants, snails, and insects.

The Ducks. — Brigaded together under the general but well-understood name of "Ducks" are a great variety of forms, not all of which, however, agree quite with the abstract idea of what a "Duck" should be. Broadly speaking, the Ducks are distinguished by having the neck shorter than the body, a broad, more or less flattened; "Duck-like" bill, and the front of the tarsus with narrow transverse plates, and shorter than the middle toe. Most of them conform to this plan, but at the outset we meet with a group — the so-called Tree-Ducks — which afford more or less of a transition between the true Ducks and the Geese, since in these the lower part of the tarsus in front is without the transverse plates, but covered with small, reticulated scales. In their main characters, however, the Tree-Ducks agree with the Ducks and are perhaps best placed with them, although in voice and vegetarian habits of feeding they certainly suggest the Geese.

The **Tree-Ducks** (*Dendrocygna*) number about ten species and enjoy a very wide, though mainly tropical, distribution. They have rather long necks and legs, short and rounded wings and short tail, and the plumage is either spotted and speckled or uniform with the different colors arranged in definite areas. In length they range from about sixteen to some twenty-four inches, and the sexes are very nearly alike. In habits they are mainly arboreal, perching readily on the limbs of trees, shrubs, or even stalks of corn. One of the most remarkable, at least as regards its distribution, is the Fulvous Tree-Duck (*D. fulva*), or Whistling Teal, as it, or its near ally, is called in India. It is found from the southern border of the United States through Mexico, then skipping Central America and Amazonia, it ranges from Venezuela and Peru to Argentina. Thence, according to Salvadori and others, it is found from tropical Africa and Madagascar through the Indian peninsula to Burma; but it seems more than probable that the Old World form is distinct, in which case it should be known as the *Dendrocygna major* of Jerdon. It is also possible that the South American bird, which is brighter colored and larger, is subspecifically separable from the northern bird, but in any case the three forms are close, if not indeed identical, and it is as difficult to explain the geographical distribution of the three as of one. It has been suggested that the bird was originally a native of the Old World and was brought by slaves from Africa to America, but this is unsupported by any evidence.

The distribution of the true Tree-Duck (*D. viduata*) is also very strange, as at present accepted, being tropical South America and the West Indies, and tropical Africa and Madagascar, but here again is the possibility of two species being confounded. The remaining species of the genus are more limited in their distribution.

The **Fulvous Tree-Duck** is a handsome bird, about twenty inches long, with the back and scapulars black, the under parts cinnamon or fulvous, the flanks marked with paler stripes; the head and neck are like the lower parts, and the upper tail-coverts are white. The late Colonel Grayson, writing of this bird as he observed it in western Mexico, says that although inhabiting the coast region it is never found in the sea, being strictly a fresh-water Duck. It arrives at the close of the rainy season in great numbers, frequenting fresh-water ponds and lakes, where it feeds upon grain and seeds, often visiting the corn-fields at night for grain. He did not procure the nest himself, although he was informed by the natives that they nested on the ground among grasses, and not in trees. This view is strengthened by the observations of Hudson, who met with it very abundantly in eastern Argentina, where it makes its appearance in the spring, in very large numbers, to breed in the marshes and on the pampas. Of the nests he says: "So extremely social are these Ducks that when breeding they keep together in large flocks. The nest is made of stems and leaves, on the water among the weeds and aquatic plants; and sometimes large numbers of nests are found close together, as in a gullery. The eggs are pure white, and each bird lays, I believe, ten or twelve, but I am not sure about the exact number; and I have so frequently found from twenty to thirty eggs in a nest that I am pretty sure that it is a common thing for two or three females to occupy one nest." In India, Hunt mentions the finding of but a single nest, and this was placed in a large hollow tree overhanging the water. It contained seven eggs.

Fig. 60. — Black-bellied Tree-Duck, *Dendrocygna autumnalis*.

Black-bellied Tree-Duck. — In the Rio Grande Valley in Texas the Black-bellied Tree-Duck (*D. autumnalis*) barely enters the United States, its main distribution being in middle Mexico and Central America. It may be known by the uniform black abdomen, the other portions of the body being mainly reddish brown. The habits of this species, according to Colonel Grayson, are similar to those of the preceding except that it is rather more nocturnal in pursuit of its subsistence, visiting the dry corn-fields during the night in great numbers,

and often causing considerable damage. Of its nest he says: "They breed in the hollows of large trees, and lay from twelve to fifteen eggs; the young are lowered to the ground one at a time in the mouth of the mother; after all are safely landed she cautiously leads her young brood to the nearest water. When taken young, or the eggs hatched under the common barnyard hen, they become very domestic without being confined; they are very watchful during the night, and, like the Goose, give the alarm by their shrill whistle when any strange animal or person comes about the house." The Indian Tree Duck (*D. javanica*) has been observed by Hume carrying its young in the claws, while others record their carrying them on the back.

Shelldrakes. — As offering another step in the transition between the Geese and Ducks, and making any sharp line between them impossible, we come to the Shelldrakes (*Tadorna*), of which two species are known. They are large, strikingly handsome birds, natives of the Old World, with rather long legs in which the tarsus is covered in front with transverse scutes, thus conforming in this "Duck-like" character to the true Ducks. They agree with the Geese, however, in the plumage of the sexes being similar, and the male retaining the same dress throughout the year. They agree with the Tree-Ducks in having a narrow membrane connecting the toes, and in the single annual moult. The best known and most widely distributed is the Common Shelldrake (*T. tadorna*), which spends the summer from Europe to southern Siberia and Japan, and the winter in Africa, India, and China. It is about twenty six inches long and has the upper back chestnut, the lower back, rump, upper tail-coverts, and tail white, the latter black-tipped, the scapulars, a part of the secondaries and the primaries black, the wing-coverts white, the head and upper neck glossy green, followed by a broad white collar, while the lower parts are dark brown and black. The bill is provided with a prominent knob, which, together with the bill itself, is bright red. It inhabits the sandy seacoast, feeding on mollusks and marine insects. Curiously enough they nest in burrows, sometimes excavating them for themselves, but oftener making use of the abandoned holes of rabbits and foxes. The burrow is from six to twelve feet long and ends in a chamber, which is lined with dry grasses, moss, and quantities of down plucked by the female from her own body. The eggs are from seven to twelve, creamy white in color. The other species (*T. radjah*) is smaller, is without the knob on the bill, and has the whole head and neck white. It occurs in New Guinea and Australia, and, according to Gould, makes its nest in hollow trees.

Shell-Ducks. — Closely allied to the last, and by some included with them, are the Shell-Ducks (*Casarca*), of which four species are known, these being widely distributed over the southern parts of the Old World. They are separated mainly on the ground of the dissimilarity of the sexes.

The **Mallard** (*Anas boscas*) may very appropriately be selected as a typical representative of the true Ducks, for it is not only a very handsome bird, well known throughout most of North America, but is equally well known and esteemed over temperate Europe and Asia. It is a large bird about twenty-four inches long, with the head and neck a soft, brilliant metallic green, the chest a

rich dark chestnut, separated from the green of the neck by a pure white collar; across the secondaries is a rich, metallic violet speculum, bordered above and below with white, while the rump, upper tail-coverts, and four middle curled tail-feathers are black; the rest of the tail-feathers are gray and the abdomen and flanks finely vermiculated grayish white, while the legs and feet are orange-red. The female is smaller and has the general plumage mottled brown and buff.

In North America the Mallard is a migratory bird, spending the summer mainly in the interior from Indiana and Iowa northward, also reaching Labrador and the Arctic regions, while in winter it retires to the Southern States and middle America. "Marshy places, the margins of ponds and streams, pools, and ditches are its favorite resorts. It walks with ease, and can even run with considerable speed, or dive, if forced to do so; but never dives in order to feed. Its food consists chiefly of the seeds of grasses, fibrous roots of plants, worms, mollusks, and insects. In feeding in shallow water it keeps the hind part of the body erect, while it searches the muddy bottom with its bill." — Brewer. When alarmed it springs up at once with a bound, uttering at the time a loud *quack*, and often rising obliquely to a considerable height, flies off with tremendous speed. The nest is usually placed on the ground, though occasionally in trees, where they may occupy the deserted nest of a Crow or Hawk. The ordinary nest on the ground is usually a bulky structure made of coarse grasses and sedges and occasionally lined with feathers or down. The eggs, six to ten in number, are pale green or greenish white, and about two and twenty-five hundredths by one and seventy hundredths inches in size. In Great Britain the Mallard is a resident species and is the most common and best known of the fresh-water Ducks, breeding in suitable situations throughout the country. During winter, however, the number is augmented by many that have bred in more northern localities. Those breeding in northern Asia visit India and China in winter, those of north Europe going in part to northern Africa. It is perhaps needless to state that the Mallard is the ancestral stock whence most of our domestic breeds have sprung.

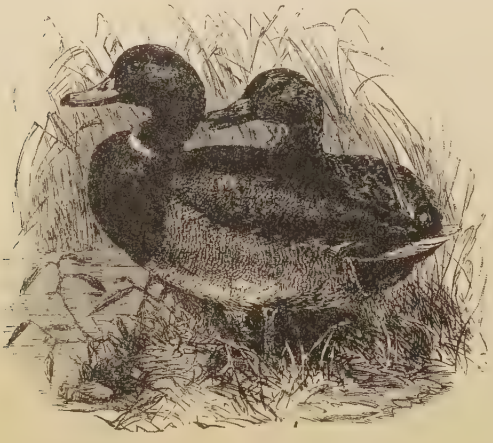


Fig. 61. — Mallard Duck, *Anas boschas*.

Other Species. — The genus to which the Mallard belongs (*Anas*) contains, in its broadest interpretation, some thirty additional species, which are by many authors distributed among several genera. The genus is practically of cosmopolitan distribution, and although many of the species are of extreme beauty

and interest, it will be necessary to pass most of them by or at most to devote only a brief space to them. Thus the Dusky or Black Duck (*A. obscura*) is a well-known bird of eastern North America, which may be distinguished from the Mallard by its darker coloration and the absence of white in the wing. It is, however, more frequent along the seacoasts than the former, but in habits and voice it is indistinguishable. The Florida Duck (*A. fulvigula*) of Florida and the Gulf coast is a smaller bird that may be known from the last by the absence of streaks on the throat. The Gadwall or Gray Duck (*A. strepera*), the Baldpate or American Widgeon (*A. americana*), and the European Widgeon (*A. penelope*) are other well-known species.

Teal. — Quite different, at least as regards size, are the Teal, of which some fifteen species are recognized. Of these the Green-winged Teal (*A. carolinensis*) may be described as a bird between twelve and fifteen inches in length, the adult male with the head and upper neck chestnut, a broad metallic green patch back of the eye, and the speculum bright metallic green, while the lower parts are waved with black and white. This bird, probably the most abundant of our smaller Ducks, is found throughout North America, breeding mainly north of the United States, and migrating in winter south to the Gulf States, Honduras, and Cuba. The nest is placed on the ground usually among grasses by which it is partially concealed, and is simply an accumulation of grasses and weeds, though often lined with down. The eggs are from six to twelve, clear ivory white in color. The Common European Teal (*A. crecca*), which may be known from this by the absence of the white bar on the side of the breast, is found throughout Europe and northern Asia and occasionally in eastern North America. The Blue-winged Teal (*A. discors*), with a bronzy greenish speculum, is found in North America chiefly east of the Rocky Mountains, while the Cinnamon Teal (*A. cyanoptera*) ranges from the Columbia River to Chile, Argentina, and the Falkland Islands.

Pintailed Ducks. — Not far removed from these are the Pintailed Ducks (*Dafila*), which may be recognized at once by the rather long neck, the bill narrow and longer than the head, and above all by the elongation of the middle pair of tail-feathers in the male. Two or three species are now recognized, the commonest and most widely distributed being the common Pintail (*D. acuta*) of the Northern Hemisphere in general, migrating south in winter to middle America and the West Indies in the New World, and to the Mediterranean countries, India, and the Indo-Malayan Archipelago in the Old World. The sexes are much alike in summer, but in winter they are quite different, the male at this season having the head and upper neck olive-brown, the back of the neck black with a white stripe on each side which is confluent with the white of the breast and lower parts; the back, sides, and flanks marked with wavy lines of black and white, while the scapulars are velvety black edged with whitish, and the speculum is metallic green or bronzy purple; the length is from twenty-eight to thirty inches.

The Pintail breeds in North America from the northern United States northward, being, for example, the most universally abundant Duck found in North Dakota, where it is evenly distributed throughout the prairie regions in lakes

and ponds and sloughs wherever they are of sufficient size. Mr. Bent, who has had much experience among the water fowl of this region, states that the nest of the Pintail is "placed almost anywhere on dry ground, or sometimes near the edge of a slough or pond, sometimes on the islands in the lakes, but more often on the prairies, and sometimes a half a mile or more from the nearest water. The nest is poorly concealed, and often in plain sight. A deep hollow is scooped out in the ground, which is sparingly lined with bits of straw and stubble, and a scanty lining of down is deposited around the eggs." The eggs, which are usually from eight to ten in number, are pale olive-green or olive-buff, and measure about two and twenty-five hundredths by one and fifty hundredths inches. The female is described as very solicitous for the safety of her brood, flying around over the head of the intruder or splashing down in the water within a few feet and acting as if wounded, quacking excitedly all the time. This species is also very common along the Yukon, where it nests usually in the sedge, lining the nest with dry grass, and when both parents leave the eggs they are carefully covered with dry leaves and feathers. As soon as the young are hatched they repair to the small creeks and tributaries of the great river until they can fly, when they go to the vast marshes and feed upon the roots of the horse-tail, and become so fat that they rise from the water with difficulty. By the end of September they have all left for the South. In the Old World the main breeding ground of the Pintail is north of latitude 60°, although it may come somewhat south of this in Siberia, Russia, and northern Germany, and a few still spend the summer in England and Ireland. In the latter places its breeding haunts are the rocky inlets in quiet sloughs and firths, often at a considerable distance from the mainland.

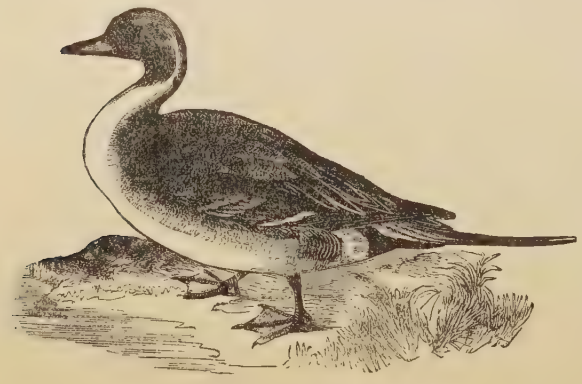


Fig. 62.—Pintail Duck, *Dafila acuta*.

The other species of Pintail are found in the Southern Hemisphere, one of the best known being the Brown Pintail (*D. spinicauda*) of South America. This handsome Duck, which is much smaller than the one just described, is, according to Hudson, the commonest Duck in the Argentine Republic and unites in the largest flocks. Its nest is built on the ground under the grass or thistles, at a distance from water, and is plentifully lined with down plucked from the breast of the female. In autumn it often visits the pampas in vast numbers to feed upon the seeds of the giant thistle, where it clusters so closely that as many as

sixty have been killed at a single shot. The Bahama Pintail (*D. bahamensis*) is another species which is mainly spread over South America, while a still smaller species (*D. galapagensis*) is confined to the Galapagos Archipelago. These last two, together with the Red billed Duck (*D. erythrorhyncha*) of Africa, are by some separated as a distinct genus (*Pœcilonetta*).

The **Shovelers** (*Spatula*) are another well-marked group of Ducks, distinguished at once by the bill, which is longer than the head and expanded at the tip until it is nearly twice as broad as at the compressed base. The upper mandible overhangs the lower at the tip, exposing the lamellæ, which resemble the teeth of a fine comb. The body is proportionally very large, while the legs are quite short. Of the four recognized species the Common Shoveler (*S. clypeata*) is the best known, being found throughout the whole of the Northern Hemisphere, breeding in North America from Texas to Alaska, and in the Old World in Europe and western Asia. In the male the head and neck are dark metallic green, the breast and outer scapulars white, while the lower parts are uniform chestnut. The speculum is bright metallic green, the bill deep black, and the feet orange-red. The female is similar but duller and more grayish brown; the length is from seventeen to twenty-one inches. This species feeds largely in shallow water and was found breeding abundantly in North Dakota by Mr. Bent. The nests were placed on the broad expanse of virgin prairie, often far away from the water, and were hidden in the thick green grass, the nest proper being a mere depression in the ground, lined with dry grasses and down. The eggs number from six to ten, and though smaller in size are similar in color to those of the Pintail. The Shoveler breeds in many places throughout the British Islands, selecting marshy lands and swampy heaths, and making a nest similar to that described above.

In southern South America the Red Shoveler (*S. platalea*) takes the place of the other at the north. It is reddish both above and below, marked with round black spots, and having the lesser wing-coverts blue and the middle ones white. It is met with in small flocks and feeds mostly in shallow water. The other species of the genus are the Cape Shoveler (*S. capensis*) of South Africa and the Australian Shoveler (*S. rhynchotis*) of Australia, Tasmania, and New Zealand.

Pink-eyed Duck. — Closely allied to the Shovelers is the Pink-eyed Duck of Australia and Tasmania (*Malacorhynchus membranaceus*), which is characterized by having a soft membrane on the sides of the bill near the tip, and by the presence of two minute spots of rosy pink on the sides of the head, a color very unusual in the plumage of Ducks. It frequents lagoons and quiet pools and is usually seen in small companies of from six to twenty individuals, and betrays very little fear or shyness at the approach of man.

Wood-Duck. — The account of the river and pond Ducks may appropriately be closed with the exquisitely beautiful Wood or Summer Duck (*Aix sponsa*) and its near relative, the Mandarin Duck (*A. galericulata*). They are small Ducks, neither exceeding twenty inches in length, with a small bill, which is much shorter than the head, and has a very large, broad nail at the tip. In the adult male the head is crested and the colors throughout are rich and varied.

The first is found throughout the whole of temperate North America, and the last in eastern Asia.

The male in the Wood-Duck has the "head metallic green, purple, and violet, relieved by a pure white line extending backward from the angle of the upper mandible along each side of the crown and upper border of the crest; another from behind the eye backward along the lower edge of the crest, and two much broader transverse bars crossing the cheeks and sides of the neck, respectively, confluent with a white throat patch; upper parts chiefly velvety black, varied

FIG. 63.— Wood-Duck, *Aix sponsa*.

with metallic hues of bronze, purple, blue, and green; chest rich chestnut, glossed with reddish purple, and marked with triangular white spots; sides of the breast crossed with a broad pure white bar and a broad deep black one immediately behind it; sides and flanks delicately waved with black on a buff or pale fulvous ground, the outer feathers beautifully ornamented with broad crescentric bars of pure white and velvety black; abdomen white; bill beautifully varied with jet-black, milk-white, lilac, red, orange, and yellow." — RIDGWAY. The Mandarin is similar but smaller, and has the middle of the crest chestnut, the sides of the neck darker chestnut, etc.

The Wood-Duck or Summer Duck, which is perhaps the handsomest of the entire Duck tribe, is, or rather was until a few years ago, a common summer resident practically throughout its entire range, which extends from Nova Scotia,

MANDARIN DUCK
(*Aix galericulata*)

New Brunswick, and Ontario northward to British Columbia, and southward through the United States to its southern border and Cuba. On account of its beauty and lack of shyness, it is one of the best-known Ducks in the whole country, but its numbers have been sadly depleted in recent years, a condition largely traceable to the unfortunate laws in many states that permit spring shooting. "It is not seclusive," says Dr. Fisher, "often making its abode near towns, or perhaps in the vicinity of farmhouses, when it may be found feeding or associating with barnyard Ducks. It takes kindly to domestication, is easily tamed and induced to breed in captivity. Its favorite haunts are small lakes, weedy ponds, or shady streams in the midst of, or in close proximity to, scattered woodlands, and, except during migration, is rarely met with about open bays or large bodies of water." It is swift and graceful in flight, rivaling the Grouse and Quail in the ease and facility with which it glides through the woods and among the branches. The food of the Wood-Duck consists of various kinds of insects, the seeds and leaves of aquatic plants, as well as beechnuts, chestnuts, and acorns. Its fondness for the latter, on which it feeds largely in autumn, gives it in some localities the name of Acorn Duck.

It commences to breed in the South early in March, and in the more northern parts of its range some four or five weeks later. "The nests are almost invariably placed in cavities in trunks or limbs of trees, often at a considerable height from the ground, and are occasionally quite a distance from the water. The eggs, which vary in number from six to fifteen, according to the age of the bird, resemble old ivory in color." The nesting cavity is often sparsely lined with small sticks, grass, and feathers from the breast of the sitting bird, or from various other birds. As soon as the female begins the duty of incubation, she is abandoned by the male, the drakes of a neighborhood banding together and flying about and feeding in company. There are differences of opinion, according to Fisher, as to whether these bands remain unbroken and aloof from the females and young through the entire breeding season or separate at intervals during the day to visit their mates.

Bay or Sea Ducks. — We now come to the so-called bay or sea Ducks (Subfamily *Fuligulinæ*), which are distinguished from the last group by having the hind toe broadly lobed or webbed. They are mainly large birds, frequenting the open water of our large lakes, bays, and seacoasts, and they obtain their food, which consists of mollusks, crustaceans, and the seeds and roots of aquatic plants, by diving, often to a surprising depth. Thus Mosley records that in Lake Erie large numbers of Old Squaw Ducks were brought in by fishermen that had been caught in their nets in a depth of water varying from eighty to one hundred feet, and greater depths than these have also been recorded.

Red-head. — The first group we shall consider is represented by the genus *Aythya*, of which the Red-head (*A. americana*) may be taken as a good example. It is about twenty inches long, the male having the head and upper neck bright reddish chestnut, the lower part of the neck, chest, upper part of the back, rump, and upper tail-coverts black, the back, scapulars, sides, and flanks finely barred with wavy lines of black, the wing-coverts gray, while the abdomen is pure white.

The bill is pale blue tipped with black and the iris bright yellow. The Red-head is found throughout the whole of North America, breeding from Maine and California northward and coming south in winter as far as the Bahamas and middle America. It frequents bays, lakes, and large rivers, being especially abundant in winter in the Chesapeake Bay, feeding largely on roots and leaves of Vallisneria, or wild celery, as it is called. It then becomes very fat and rivals the celebrated Canvas-back as a table bird, and is not infrequently sold under the name of its near relative, which it closely resembles. Large numbers are shot for market or caught in nets. Several nests of this species were found by Mr. Bent in the Devil's Lake region of North Dakota. They were placed in clumps of reeds and were handsome nests, made of dead weeds, deeply hollowed and lined with broken pieces of weeds mingled with considerable white down; they were usually on masses of dead weeds built from shallow water and held in place by living reeds growing through them. One nest contained twenty-two eggs, but this was an unusual number, twelve or fifteen being the ordinary complement. The Red-head seems to be particularly careless about laying its eggs in the nests of other Ducks, Mr. Bent finding three cases of from three to five occurring in nests of the Canvas-back, and scattered eggs were seen in nests of the Ruddy Duck and others. In color they vary from olive-buff to a light cream-buff, and in size from two and forty-five hundredths to one and seventy-two hundredths inches.

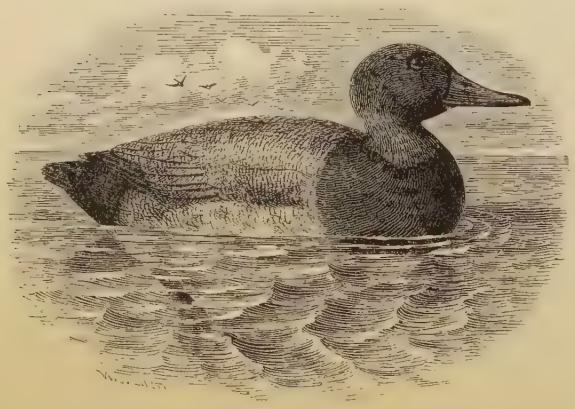


Fig. 64. — Canvas-back Duck, *Aythya vallisneria.*

The **Canvas-back** (*A. vallisneria*), which as above indicated is often confused with the Red-head, is a larger bird and has the head and neck rufous-brown, the chin and crown blackish, and the bill deeper at base and larger, but otherwise they are similar. This bird is also found generally throughout North America, but nests only in the interior from Minnesota and Dakota northward to the Arctic Circle. Mr. Bent, whom we have quoted several times, found a number of their nests in the Devil's Lake region, North Dakota. One nest containing eight eggs he describes as follows: "It was a large nest built upon a bulky mass of wet dead weeds, measuring eighteen inches by twenty inches in outside diameter, the rim being built up six inches above the water, the inner cavity being about eight inches across by four inches deep. It was lined with smaller pieces of dead reeds and a little gray down. The small patch of reeds was completely sur-

rounded by open water about knee deep, and the nest was so well concealed in the center of it as to be invisible from the outside." Another nest, also in a clump of reeds and surrounded by water over knee deep, "was beautifully made of dead reeds firmly interwoven, held in place by the growing reeds about it, and sparingly lined with gray down." The eggs are similar to those of the Red-head except that they are much darker. In winter the Canvas-back is found from the Chesapeake Bay to the Greater Antilles, being especially abundant on the bays and marshes of the Carolina coast, where it is procured in great numbers for the northern markets. It is highly prized by epicures, although by some it is regarded as no better or even inferior to the Red-head in this respect. Many devices are resorted to to secure the birds, such as shooting from a blind, attracting them within range by means of decoys of various kinds, a blinding light used at night, and by nets set over their feeding grounds. The two last mentioned are considered very unsportsmanlike and moreover are unlawful.

The **Pochard** (*A. ferina*) of northern Europe and Siberia is even more closely related to the Red-head than is the Canvas-back. Like the Red-head it has the whole head and upper neck chestnut-rufous, but has the bill banded with dark and pale bluish gray and the general color of the plumage more finely waved with dusky lines. The female differs from the female Red-head in hardly more than the color of the bill. This species nests mainly in the North, but quite a number still linger in the British Islands, although the draining of the marshes and fens is constantly causing a decrease. The nesting habits are much like those of its American cousin, the nest being placed in a dense tuft of reeds or other marsh-loving vegetation, and lined with dried reeds, grasses, and a scanty inner lining of down.

Other more or less closely related Old World species are Baer's Pochard (*A. baeri*) of eastern Siberia and central Asia, the White-eyed Pochard (*A. nyroca*) of Europe and Asia, the African Pochard (*A. erythrophthalma*), which is also said to be the same as the bird of southern Brazil, and the Australian White-eye (*A. australis*), so called on account of the white iris.

The **Scaup-Ducks**, of which some six or eight forms are recognized, are by some placed in the same genus with those last mentioned, and by others in a separate genus (*Fuligula*). In these birds the culmen is as long as the outer toe with its claw, the bill is wider at the tip than at the base, and the head and neck in the adult males is black, while the speculum is white or bluish gray tipped with black. Perhaps the best-known species is the Scaup-Duck (*F. marila*), a bird from eighteen to twenty inches long, found from western Europe to Kamchatka and throughout North America. It breeds in the extreme northern parts of its range, penetrating to lakes and rivers often at a considerable distance from the sea. It is more or less gregarious at all seasons, and feeds on shell-fish, crustaceans, and aquatic plants. Its voice is described as very harsh and discordant, resembling the word *scaup*, screamed in a loud tone. The nest is placed near water and the eggs are from six to nine in number, of a pale greenish gray color. It is found over North America generally, breeding in the far North, Dall having found it nesting near the mouth of the Yukon, making but a rude excavation

on the ground and lining it with a few straws. MacFarlane did not find it in Arctic America, although it probably nests there, nor did Mr. Bent find it in North Dakota, although it is reported as nesting occasionally in Minnesota and Manitoba. In winter it comes far south, being abundant along the California coast, and on the Atlantic coast from Long Island to northern South America, preferring the salt-water marshes. The Lesser Scaup-Duck (*F. affinis*), also of North America, is smaller than the last and has the head in the male glossed with purple instead of green. Its habits are similar to those of its larger relative, and, although its main nesting ground is in the far North, it not infrequently nests from Iowa and Manitoba northward. It, however, has a greater preference for fresh water and was observed by Mr. Bent about the larger lakes in North Dakota, where he found several nests. These were usually on islands and were concealed in the taller prairie grass or under low bushes. The eggs number from nine to fifteen and are of a rich dark buff or coffee-color. It appears that the males desert the females after incubation begins and flock by themselves in the sloughs or small ponds.

Other forms are the Chinese Scaup-Duck (*F. affinis mariloides*) of eastern Asia, the New Zealand Scaup (*F. novæ-zealandiæ*), the Ring-necked Duck (*F. collaris*) of North America, which takes its name from the presence of a chestnut collar about the neck, and finally the Crested Scaup-Duck (*F. fuligula*) of the eastern part of the Old World, which may be known by the long, pendent occipital crest. Several fossil forms have also been described from the upper Tertiary of France and Italy.

The **Golden-eyed Ducks** (*Clangula*), so named on account of the bright yellow iris, are handsome birds, the male with the upper parts pied black and white, and the lower parts entirely white, while the head and upper neck is black glossed with green, blue, or violet and set off by a white spot between the bill and eye. Of the three or four forms the true Golden-eye (*C. clangula*) is found in Arctic Europe and Asia, migrating south in winter to northern India and China. Not much is known of its habits beyond the fact that its nest is placed in a hollow tree and the eggs are bright green in color. Hardly distinguishable from this except by its larger size is the American Golden-eye (*C. clangula americana*), which is found throughout North America generally, nesting from Maine and North Dakota northward, and coming far south in winter. Although this species may occasionally nest on the ground, as reported by Dall, who found it nesting in marshes along the Yukon, it usually selects a hollow stump or tree in which to deposit the eggs. It is not particular as to the kind of tree or the nature of the cavity so long as it is large enough to accommodate the bird. Thus Bent found several nests in North Dakota variously placed in swamp oak, elm, and cotton-wood trees, at a distance of from eight to twenty feet from the ground. One, in a dead branch of a small elm, was only three inches wide and four and one half inches high at the entrance, and about three feet deep. The eggs, some eight to fourteen in number, are placed on chips and dead wood at the bottom of the cavity or sometimes in a thick, matted mass of down. In color the eggs are a clear, pale, malachite green. Barrow's Golden-eye (*C. islandica*), which may be

distinguished from the last by the purplish blue on the head and throat and by the much larger and differently shaped white patch at the base of the bill, is more northern in distribution, being found in summer from the Gulf of St. Lawrence and the Rocky Mountains of Colorado northward, reaching Greenland and Iceland; its habits are similar to those of its near relative.

Buffle-head.—Very closely related, and indeed often placed in the same genus with the last, is the Buffle-head, Butter-ball, or Spirit Duck (*Charitonetta albeola*), a small North American species about fifteen inches in length, which may be distinguished by the presence of a broad white patch which passes around the back of the head from eye to eye. As an expert diver is perhaps not exceeded; its ability to disappear at the flash of a gun before the charge of shot reaches it has given rise to its name of Spirit-Duck. Like the Golden-eye it nests in hollow stumps and trees, laying from six to twelve light buff-colored eggs.

Fig. 65.—Buffle-head Duck, *Charitonetta albeola*.

Old Squaw.—Equally well marked is the Old Squaw, Old Wife, or South Southerly (*Harelda hyemalis*), which may be known among other characters by the very long, narrow middle tail-feathers, which are held at an angle of 60 degrees when the bird is sitting on the water. It is found throughout Arctic Europe, Asia, and North America, ranging south in winter to southern Europe, central Asia, and China, and in the New World nearly across the United States. It is an extremely swift flyer and it is also a very noisy bird, continually scolding or "talking."

Steamer-Duck.—In the southern part of South America, about the Straits of Magellan, the Falkland Islands, and the Chilean coast, is a very curious Duck known as the Steamer-Duck (*Tachyeres cinereus*), so called from its peculiar method of locomotion. It is a large sea Duck, some thirty inches in length, mainly gray throughout, with a reddish patch on the throat, and white secondaries. When young this bird possesses the power of flight, but this faculty is gradually lost as the body increases in size and weight to such an extent, owing to the deposition of mineral matter in the bones and other causes, that it gradually abandons the habit of flight, and it paddles itself around with rapid movements of its wings, much after the manner of a side-wheel steamer, whence, of course, its name. It moves with astonishing rapidity, and this combined "with its diving powers are sufficient to preserve it from threatened danger."

Labrador Duck.—With a melancholy history equal almost to that of the Great Auk is the handsome Labrador or Pied Duck (*Camptolaimus labradorius*), which is now believed to be extinct, the last individual so far as known having been killed in 1878. It was a large, powerful Duck, from eighteen to twenty-three inches long, the male with the head, upper neck, upper breast, sides, and

much of the wings white, while the center of the crown, collar, back, and lower parts are black; the female is brownish gray, with the speculum white. This species was a typical sea Duck, frequenting the Atlantic coasts of North America, probably breeding from Labrador northward, but coming south in winter to Long Island, New Jersey, and possibly the Great Lakes. So far as our knowledge goes it has always been a rare bird, being shy and difficult of approach, but as its flesh was rather tough and dry it was not highly esteemed as a game bird, and so was not taken in any numbers, though Mr. George N. Lawrence states that fifty or more years ago it "was not unusual to see them in Fulton Market, without doubt killed on Long Island." There is very little authentic information regarding its habits, and its nest and eggs are unknown; in fact, all that apparently remains of this fine Duck are some forty-one skins and a few bones scattered among the museums and collections of the world. The causes which led to its extinction are unknown and unaccountable, although various theories have been proposed to explain it, such as destruction by an epidemic disease, the continued robbing of its nests by Indians, etc.

Eider-Ducks. — Passing over the Harlequin Duck (*Histrionicus histrionicus*), a strong-flying sea Duck of the northern parts of the Northern Hemisphere, we come to the Eiders and Scoters, which are all strong-flying and diving sea Ducks. Of these the Eider-Ducks are beyond question the most widely known and on the whole the most interesting. Some six or seven forms may properly be classed under this designation, these having been grouped under three genera, although by some regarded as belonging to but a single generic type. Of these the so-called true Eiders (*Somateria*) may be first considered. They are large and strikingly handsome birds with conspicuous and strongly marked colors, — velvety black and snowy white, variegated with buff and delicate pale sea-green. The males are mostly black below and white above, while the females and young have the plumage barred with dusky and pale fulvous or rusty. Of the five forms recognized the European Eider (*S. mollissima*) is perhaps the best known. The male has the bill dull grayish olive in life and the breast a deep vinaceous buff. It is a native of northern Europe. A subspecies of this is the Greenland Eider (*S. m. borealis*), which differs in having the bill orange yellowish and the breast paler buff. It is found in eastern Arctic America, including Greenland, and coming south to northern Labrador in summer and to the northern border of the United States in winter. The American Eider (*S. dresseri*), which is also found on the Atlantic coast of North America from Maine to Newfoundland and southern Labrador, has the naked angle on the side of the forehead in the male broad and rounded (this angle being narrow and pointed in the last two), and the black of the head bordered beneath with pale green for its entire length. Similar to this, but larger and distinguished by a V-shaped mark of black on the throat, is the Pacific Eider (*S. v-nigra*), which ranges over northwestern America from the Great Slave Lake westward, reaching also into eastern Asia. The King Eider (*S. spectabilis*), of the northern portions of the Northern Hemisphere, has the V-shaped mark of black on the throat as in the last, but may be known by the light bluish gray on the top of the head. The Spectacled Eider (*Arctonetta*

fischeri), although similar in general plumage to the other Eider-Ducks, differs markedly in the shape of the bill, this being shorter than the head and covered at base with a dense mat of soft velvety feathers, and further in the "cushion" of stiffened feathers which surround the eyes. It is a rather rare and little known species confined to the coast of Alaska from Norton Sound to Point Barrow. The last member of the group, although perhaps not a true Eider, is Steller's Duck (*Polysticta stelleri*), a bird of the high Arctic and sub-Arctic coasts of the Northern Hemisphere.

Fig. 66. — American Eider-Duck, *Somateria dresseri*.

Although it would be of interest to recount the life histories of all these birds, lack of space necessitates confining our attention mainly to a single species, and as perhaps the best known this may be the European Eider. Although the birds themselves may not be very generally known, since much of their life is spent at sea, the uses to which the soft down has long been put makes them widely familiar. This bird makes its summer home well within the Arctic Circle on the islands and rocky coasts of Spitzbergen, Iceland, Nova Zembla, and the islands north of Siberia. Here they resort in thousands and in many places are carefully protected and induced to nest by the inhabitants, who profit largely by gathering the down. The following graphic account is from the pen of Mr. C. W. Shepard, who describes the conditions he found on the northern coast of Iceland: "The islands of Viga and Œdey are their headquarters in the northwest of Iceland. In these they live in undisturbed tranquillity. They have become almost domesticated, and are found in vast multitudes, as the young remain and breed at the place of their birth. As the island was approached we could see flocks upon flocks of the sacred birds, and could hear their cooing at a great distance. We landed on a rocky, wave-worn shore. It was the most wonderful ornithological sight conceivable. The Ducks and their nests were everywhere. Great brown Ducks sat upon their nests in masses, and at every step started from under our feet. It was with difficulty that we avoided treading on some of the nests. On the coast of the opposite shore was a wall built of large stones, just above the high-water level, about three feet in height, and of considerable thickness. At the bottom, on both sides of it, alternate stones had been left out, so as to form a series of square compartments for the Ducks to nest in. Almost every compartment was occupied, and as we walked along the shore, a long line of Ducks flew out, one after the other. The surface of the water also was perfectly white with

drakes, who welcomed their brown wives with loud and clamorous cooing. The house itself was a marvel. The earthen walls that surrounded it and the window embrasures were occupied by Ducks. On the ground the house was fringed with Ducks. On the turf slopes of its roof we could see Ducks, and a Duck sat on the door-scraper. The grassy banks had been cut into square patches, about eighteen inches having been removed, and each hollow had been filled with Ducks. A windmill was infested, and so were all the outhouses, mounds, rocks, and crevices. The Ducks were everywhere. Many were so tame that we could stroke them on their nests; and the good lady told us that there was scarcely a Duck on the island that would not allow her to take its eggs without flight or fear. Most of the eggs are taken and pickled for winter consumption, one or two only being left in each nest to hatch." The nests in many places are described as being made of seaweed and lined with the down, plucked by the female from her breast, until it makes a heap four or five inches deep around and among the eggs. The product of down from each nest is about one sixth of a pound, and curiously enough is said to be of a better quality than when taken from the dead bird by hand. In some localities the nests are despoiled of the down and the bird forced to make use of grasses and stems as a lining. The eggs are four or six in number and usually of a pale olive-buff or olive-green. After incubation is well under way the males generally live apart from the females, and often at a distance from shore. The food of these Ducks consists largely of mollusks and crustaceans, which they secure by diving and which they are enabled to crush with their powerful bills.

The **Scoters** (*Oidemia*), or "Coots" as they are sometimes called, are large surf or sea Ducks in which the large, strong bill is usually much swollen at the base. The bill is also brightly colored with yellow, orange, or red. The males are, in general, uniform black, relieved in some cases with white on the wing or with white patches on the head, while the females are mostly plain brownish, lighter and more grayish beneath. They have short, strong legs placed far back on the body, large feet, and strong wings. All are natives of the Northern Hemisphere, although not so distinctly Arctic as the Eiders, four of the six species (one of which is perhaps accidental) being found in North America. The habits of all the species are practically the same. As a rule they are found only on the sea or its estuaries, where they feed almost exclusively on mollusks, such as the black mussel, shallops, and razor-shells. These they obtain by diving, often to a depth of forty feet, though they prefer water less than half this depth. As an indication of how large a shell-fish they can swallow, Mackay mentions mussels two and one half by one inch as having been taken from them. Eight or ten of the ordinary size constitute a meal. The Scoters are described as unusually silent birds, depending mainly upon sight in discovering their companions. The devotion of the male to his mate is very marked, and when she is killed he will return again and again to the place where he last saw her though repeatedly shot at. Another peculiarity, noted by Mackay, who has enjoyed exceptional opportunity of observing them off the New England coast, is that "when wounded and closely pursued, they will frequently dive to the bottom and retain hold of rockweed with

the bill until drowned, preferring thus to die than to come to the surface to be captured."

The European Scoter (*O. nigra*), found throughout the northern portions of the Eastern Hemisphere, has the male uniform black, with the bill black, marked with a yellow or orange spot in front of the basal knob. Similar to this, but with the nail of the bill arched and strongly hooked, is the American Scoter (*O. americana*), which ranges over much of North America, breeding in Labrador and the northern interior, and migrating on the Atlantic coast as far south as Virginia, on the Great Lakes, and off California. With about the same range is the Surf Scoter (*O. perspicillata*), which may be known by the pure white patch on the forehead and on the hind neck, the plumage otherwise being black. The three remaining species — the Velvet Scoter (*O. fusca*), White-winged Scoter (*O. deglandi*), and the Kamchatkan Scoter (*O. stejnegeri*) — all have a white mark on the wing and differ among themselves in only minor particulars.

Ruddy Duck. — The so called Stiff tailed Ducks, in which the feathers of the tail are narrow and very stiff, constitute the subfamily *Erismaturinæ*, and are comprised in four genera and about a dozen species. Of these the Ruddy Duck (*Erismatura jamaicensis*) of temperate North America may be taken as a type. The male has the upper parts uniform reddish chestnut, with the top of the head black and the side of the head white, while the lower parts are silvery white. The female and young are grayish brown above, the plumage marked with fine wavy bars of buff; the species is about fifteen inches in length. This species frequents the salt ponds along the coast and is also found on the inland rivers and lakes. Its food, which is said to consist mainly of aquatic plants, is obtained by diving. It is usually a rather tame species, permitting the close approach of a boat, and on the water it makes rather a curious appearance, as it often carries the tail erect. While its main nesting ground is far north, it breeds locally throughout its range, placing the nest in a marsh and usually on a floating mass of vegetation. The six to ten eggs are creamy white in color. Other species are found in South America, Africa, and Australia.

Mountain Ducks. — Before passing to the final subfamily we may mention briefly the Mountain Ducks (Subfamily *Merganettinæ*), so called from their dwelling exclusively on the rushing mountain streams. They are medium-sized or small birds with narrow compressed bills as in the Mergansers, but differ from them in the absence of the tooth-like serrations on the edges of the mandibles, and in the rather long and stiff tail. Eight species are known, one in the mountain streams of New Zealand and the others in the rivers of the Andes. Of the New Zealand species (*Hymenolæmus malacorhynchus*) Buller says, "Far up the mountain gorge, where the foaming torrent, walled in on both sides, rushes impetuously over its shingle bed, surging around the huge water-worn boulders which obstruct its course, and forming alternately shallow rapids and pools of deep water, there the Mountain Duck is perfectly at home."

The **Mergansers**, or **Fish Ducks**, comprise the remaining subfamily (*Merginæ*) of the great group of Ducks. They are fish-eating Ducks with slender bodies, long Grebe-like necks, and long, narrow, compressed bills, which may be longer or

shorter than the head. The lower mandible is without lamellæ along the sides, but is provided with a series of distinct tooth-like serrations along the upper edge, as are also the edges of the upper mandible. As much of their food is procured by diving, they are provided with strong feet such as characterize the sea Ducks, just considered. The nine recognized species are placed by some students in a single genus, but by others, and perhaps better authorities, they are separated into three fairly well marked genera. That the group is an old one is shown by the fact that two genera, each with a single species, are known from the Miocene beds of Patagonia.

The **Smew**, or **Nun** (*Mergus albellus*), of the Old World is the sole representative of its genus, being separated from the remaining genera by the culmen being shorter than the tarsus. The male is a handsome crested bird some seventeen inches long, with the plumage mainly satiny white, relieved by a black patch before and below the eye and a greenish black triangular patch on the crest, while the back is black, the lesser wing-coverts white, and the greater coverts black with two narrow white bars. The female is similar to the male except that the head is reddish brown, the collar ash-gray, and the crest inconspicuous. In early summer the male assumes the plumage of the female, which is retained until fall. The full-plumaged males are said to be very rare, perhaps because they do not approach the shore except in severe weather, while the females and immature young are relatively abundant in winter, especially off the east coast of England and Scotland, where they are called Red-headed Smews by the fishermen. The summer home of the Smew is in the Arctic regions, the western limits of its nesting range being Finnish Lapland. In winter it migrates to southern Europe, northern India, and Japan, and occasionally or accidentally visits eastern North America. Its nest is placed in hollow trees, or in some parts of Lapland in boxes prepared for its use by the people.

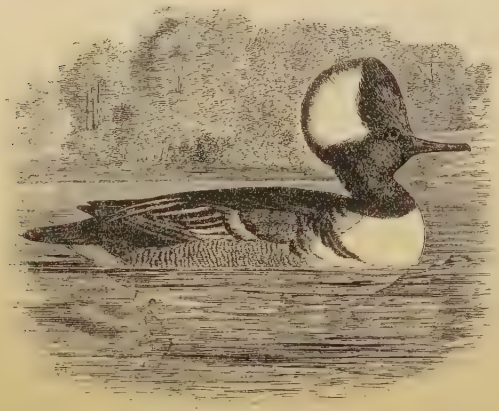


Fig. 67. — Hooded Merganser, *Lophodytes cucullatus*.

Hooded Merganser. — The beautiful Hooded Merganser (*Lophodytes cucullatus*) is also the only representative of its genus, it and the true Mergansers having the culmen longer than the tarsus, while from the Mergansers it differs in having the serrations of both mandibles short, blunt, and not distinctly inclined backwards at the tips. The male has a magnificent circular crest of hairlike feathers, which is pure white, bordered by a sharply defined black rim. The head, neck, and upper back are black, the breast and abdomen white, and the

sides light cinnamon finely barred with black. The female has a much smaller crest and is grayish brown above and white below, while the young are similar to the female, but have the crest much more rudimentary. The Hooded Merganser is found generally throughout North America, breeding mainly to the northward and migrating southward in winter as far as Mexico and Cuba. It frequents the quiet water of ponds, lakes, and slow-flowing streams, feeding largely on vegetable substances. It nests in hollow trees after the manner of the Wood-Duck, and lays from six to ten buffy white eggs. Mr. Bent found it to be one of the rarer Ducks in the Devil's Lake region of North Dakota, while Mr. Ernest E. Thompson reports it as a common summer resident in various parts of Manitoba.

Fig. 68. — Red-breasted Merganser, *Merganser serrator*.

True Mergansers. — Of the true Mergansers (*Merganser*) two species are found in North America, the American (*M. americanus*) and the Red-breasted (*M. serrator*). All have a more or less conspicuous occipital crest, the males being grayish above, somewhat pied with black and whitish, and creamy white or pale salmon-colored below, while the neck and head are greenish black. Most of them nest in hollow trees, but some, as the Red-breasted species, may nest on the ground, under a rock or even in a hole in the ground. The eggs are usually from six to ten in number and creamy or buffy white in color.

CHAPTER XX

THE FALCON-LIKE BIRDS

(Order *Falconiformes*)

IT is a fact well known that among the mammals there are certain groups — the so-called carnivores — which are especially adapted for preying upon their fellows. Among the birds there are also groups the members of which are fitted in one way or another for an equally rapacious existence, inasmuch as they obtain their entire subsistence from animal life, most of which they pursue and capture alive. The most prominent of these rapacious groups of birds was formerly, and indeed may still conveniently be called, the Raptores, or Birds of Prey. It was divided into two parts, the Diurnal Birds of Prey, or those which mainly seek their food by daylight, as Eagles and Hawks, and the Nocturnal Birds of Prey, typified by the Owls, which secure most of their prey by night. This implied a more or less close relationship between the Eagles, Hawks, and allied forms, and the Owls; but investigation in recent years has settled pretty conclusively that, beyond the similarity of their adaptation for rapacious life, there is little or no real relationship between them. The Owls could not possibly have been derived from existing Diurnal Birds of Prey, nor even from a common ancestor, but appear to find their closest relatives among the Roller-like birds, where they are accordingly placed. Their affinities and interrelationships will be fully considered under that group.

Among the Falcon-like birds the adaptation to a raptorial mode of life has so profoundly modified the skeleton that much of the evidence concerning the origin of the group has been defaced or obscured. According to Beddard, and this is confirmed by Pycraft, — both eminent anatomists, — it appears that the evidence points to the derivation of this group from the Stork-like birds, not, of course, directly from the modern representatives, but at a point low down on the gruine stem, even before the characters common to the diverging branches of Storks and Cranes began to undergo transformation. It is not necessary to go further into this matter at present, but it may be stated that much remains to be done in the way of investigating the skeletal and other characters within this and neighboring groups before the final word can be said.

The Falcon-like birds are so characteristic in appearance and in general so well known, that they are hardly ever mistaken, even by the most careless observer. Typically they are birds of robust size, with powerful wings which enable them to pursue and capture other birds or swift-moving animals of various

kinds. They mostly have short but very stout bills with a strongly arched tip and sharp cutting edges, thus being admirably adapted for tearing flesh, skin, or even breaking bones. They have mostly rather short, stout legs, although, as will be shown later, there are certain notable exceptions to this. The feet are also strong and provided, in most cases, with long, much curved, and very sharp claws. In those which feed on dead animal matter, however, the claws are often blunt and weak as compared with those which capture their own prey. Another distinguishing feature is the cere, which is a peculiar membrane sheathing the base of the upper mandible. The nostrils open in or through the edge of the cere, which may be either soft or horny. There are only two other important groups of birds possessing the hooked bill and the cere: namely, the Owls and the Parrots. From the former they differ in the close, harsher plumage, non-reversible fourth toe (except *Pandioninæ*), and diurnal habits, and from the latter in the structure of the feet. Technically the Falcon like birds have many osteological features in common with the two preceding orders, but they may always be separated from them by the raptorial feet, which are never webbed.

The present order (*Falconiformes*) is divided, according to Pycraft, into three suborders: the *Cathartæ*, which embraces the American Vultures, the *Gypogerani*, which includes only the Secretary-Bird of Africa, and the *Accipitres*, under which is included all remaining forms of Falcons, Eagles, Hawks, Buzzards, Old World Vultures, etc. The latter is further subdivided into two families, the *Falconidæ*, with two subfamilies, and the *Buteonidæ*, embracing thirteen subfamilies. The characters on which each is founded are presented under the several headings.

THE AMERICAN VULTURES

(Suborder *Cathartæ*)

Notwithstanding the fact that the American Vultures quite closely resemble the Old World Vultures in general appearance and habits, there are certain marked differences which well entitle them to be ranked as a separate group. Among other things they have the relatively short hind toe inserted above the level of the others, lengthened, slightly hooked bills, and perforated nostrils, that is, with an opening between them inside the bill. The head is entirely naked or else partially covered with down, and the feet are provided with blunt claws which are wholly unfitted for grasping. They feed largely, though not exclusively, on decaying animal matter, and have the exceedingly offensive habit of vomiting the foul contents of the stomach when captured or surprised. They build no nest, the eggs — from one to three, usually two in number — being placed in a hollow tree or log or in a cave or crevice in the rocks, or even on the bare ground. The young are fed by regurgitation, or the emptying of the contents of the stomach into the mouths of the young.

The American Vultures are all large, though somewhat sluggish, birds with great powerful wings and are past masters in the art of flying. On this point

Bendire says of the California Vulture: "Its flight is graceful beyond comparison as it sails majestically overhead in gradually contracting or expanding circles, now gently falling with the wind and again rising easily against it, without a perceptible motion of its pinions. While on the wing it looks more than the peer of any of our birds, the Golden Eagle not excepted."

The American Vultures are distributed into five genera and some nine or ten species, of which three genera and the same number of species are represented in the United States. With the exception of the northern portion of their range, they are mainly resident throughout the year wherever found.

Turkey Buzzard. — One of the most familiar and widely distributed members of the group is the Turkey Vulture, or Turkey Buzzard (*Cathartes aura*), which is found in two minor geographic races over nearly the whole of temperate and tropical America, including the West Indies, ranging south to Patagonia, and north, more or less regularly, to southern New England, New York, the Saskatchewan, and British Columbia. They are large birds, from twenty-six to some thirty-two inches in length, with an expanse of wing of about six feet, the general coloration being blackish above with a greenish and violet gloss, and uniform dull black below. The typical form (*C. aura*), which occurs southward from the state of Vera Cruz, Mexico, is relatively small and has the feathers of the back with narrow and poorly defined brown borders, while the color of the upper sides of the shafts of the primaries is soon bleached to old ivory or yellowish. The northern form (*C. a. septentrionalis*), which is the one from northern Mexico northward, is of larger size and has the brown borders to the feathers of the upper parts more pronounced, while the upper side of the shafts of the primaries usually remains permanently dusky brown. In both the naked skin of the head is livid crimson in life. "They look their best aloft," says Bendire, speaking of the northern race, "as their flight is exceedingly easy and graceful; while the apparent absence of all effort as they sail in stately manner overhead, in ever changing circles, and without any apparent movement of their well-shaped wings, makes them really attractive objects to watch; but let them once descend to the ground or alight on a tree, and attractiveness ceases; now they are anything but prepossessing, and it requires no effort to place them where they properly belong, 'among the scavengers of the soil.'"

Fig. 69.—Turkey Vulture, *Cathartes aura*.

Although the Turkey Vulture feeds very largely upon carrion, and in this capacity is of great benefit as a scavenger, it is said to prefer fresh meat when this can be procured. "The reason of their eating it when decayed," according to Dr. Ralph, is "that they cannot kill game themselves and their bills are not strong enough to tear the tough skin of many animals until it becomes soft by

decomposition." The following account of their feeding habits is also from the pen of Dr. Ralph: "When they find a dead animal they will not leave it until all but the bones and other hard parts has been consumed, and if it be a large one, or if it have a tough skin, they will often remain near it for days, resting by night in the trees near by. After they have eaten — and sometimes they will gorge themselves until the food will run out of their mouths when they move — they will, if they are not too full to fly, roost in the nearest trees until their meal is partly digested, and then commence eating again."

There is a widespread popular belief that these birds, as well as the other members of the group, possess a wonderfully acute sense of smell which enables them to detect the presence of carrion at a great distance, and many are the tales that have been told and which in a measure seem to prove the truth of this supposed power; but, on the other hand, the opposing facts are so strong as to make it difficult to decide between them. As might be expected from dissections of the olfactory organs as made by Owen and others, their sense of smell is probably more highly developed than in most birds, but it is doubtful if it is more acute than in most human beings. Numerous experiments have been tried, not only with this species but with other of the Vultures, of concealing carrion near where they were congregated, and in no case did they find it. It would be interesting to give an account of many of these experiments, but we have only space for the following, taken from Barrows: "The rough painting of a sheep, skinned and cut open, soon brought Vultures to examine and tug at it, and although the experiment was repeated scores of times it never failed, on each fresh exposure, to attract the hungry birds. A wheelbarrow load of tempting carrion was next covered by a single sheet of thin canvas, above which bits of fresh meat were strewn. The fresh meat was soon eaten, but although the Vultures must frequently have had their bills within an eighth of an inch of the carrion beneath, they did not discover it." On the other hand, Mr. Ridgway is strongly of the opinion that they can and do detect the presence of carrion by the sense of smell. He says, "I have repeatedly seen them attracted to a dead animal so thoroughly concealed from view that they could not possibly see it even from immediately overhead, much less from a distance." He also relates an instance where he observed dozens of Turkey Buzzards coming "up the wind" to a field which had been newly fertilized with fish guano, undoubtedly attracted only by the odor. Their acuteness of vision is, however, beyond question, and it is upon this that they undoubtedly largely depend in securing their food. They have been known to descend from a height at which they were almost invisible to human sight to feed upon a dead snake a few inches long, that must have been discovered from this lofty position.

The Turkey Vulture deposits its eggs, usually two in number, in a hollow log or tree, among rocks or frequently on the ground. The eggs are thought by many to be the handsomest of those of any of the raptorial birds. Their ground color is generally a light creamy tint, occasionally a dull white, and they are blotched, smeared, and spotted with various shades of reddish brown, chocolate, and lavender, these markings usually predominating over the larger end.

Other Species. — There are three other species in the genus with the Turkey Vulture: the Falkland Island Turkey Vulture (*C. falklandicus*), found in the Falkland Islands, Patagonia, and Chile, the Amazonian Turkey Vulture (*C. perniger*) of Guiana, Amazonia, and Peru, and the small black Brazilian species (*C. urubitinga*), the latter having uniform black wings and a yellow instead of reddish head. Their habits are presumably similar to those of the common species.

The **Black Vulture** (*Catharista urubu*) is found throughout the whole of tropical and warm-temperate America, ranging south to Argentina and Chile, and north regularly to North Carolina and the lower Mississippi Valley. It is the only member of its genus, being from twenty-three to twenty-seven inches in length and having a spread of wings of about four and one-half feet. In color it is uniform dull black, with the shafts of the quill-feathers white. The naked skin of the head and fore neck is dusky, thus distinguishing it at once from the Turkey Vulture.

The habits of the Black Vulture are in some respects similar to those of the first-mentioned species, but "it is not nearly so graceful a bird on the wing as the latter, its flight being much heavier and apparently laborious, and is accomplished by considerable flappings of the wings." The Black Vulture is apparently more or less gregarious in its habits at all seasons of the year and undoubtedly depends much more on its keen sight than its sense of smell in finding its food. They breed frequently in communities, making little or no nest, and the eggs, usually two in number, are always placed on the ground, under bushes, old logs, or occasionally in perfectly open situations. The eggs are similar to those of the Turkey Vulture except that the ground color is a pale gray-green.

California Vulture. — By far the largest of the species found in the United States is the California Vulture (*Gymnogyps californianus*), or Condor, as it is frequently called. It is from forty-four to fifty-five inches in length, with an extent of wings of from eight and one-half to eleven feet, while the weight is from twenty to twenty-five pounds. The color is dull black with the wing-feathers edged and tipped with grayish or white, producing a conspicuous white area which is visible when the bird is soaring. The bare portion of the head is yellowish or orange. The California Vulture is almost confined to the state of California, extending formerly as far north as the Columbia River, and south into the peninsula of Lower California and possibly into northwestern Mexico. It has apparently never been an abundant species and has been persecuted in recent years to such an extent that it has become extremely rare, if not indeed on the verge of total extermination. This unfortunate decrease in numbers has been principally caused by poison which has been placed on carcasses of animals by stockmen as a means of ridding the country of bears, panthers, wolves, coyotes, etc. It has now become not only rare but extremely shy, and several Californian ornithologists have never seen it in a wild state. It nests in wild and inaccessible localities, principally among rugged rocks and cliffs, choosing usually a cavern or crevice in the rocks often hundreds of feet from the ground. The egg, for it usually lays but one, is of a uniform light grayish green color and unspotted.

As might be expected, it is of great size, measuring about four and one half by two and one half inches, and holding some nine fluid ounces of water. Only about twenty of these eggs are said to be preserved in collections, a far less number than is known of the long extinct Great Auk. At a recent meeting of the American Ornithologists' Union (November, 1906), Mr. William L. Finley presented a paper, illustrated by a superb series of photographs, in which he recounted the life history of a California Condor from the moment of leaving the egg until the bird was practically full grown. At first, the parent birds were very shy, but repeated visits to the nest (a cave in the precipitous wall of a canyon) for the purpose of photographing the young bird so tamed them that they permitted themselves to be "taken" by the camera at a distance of only five or six feet, displaying not the least concern. Many curious anecdotes of this bird were related, such as its fondness for bathing and for human society, its rejection of any food but fresh beef, its method of trying its wings, etc. This bird, named the General, is now in the New York Zoölogical Park.

Fig. 70. — Condor, *Sarcorhamphus gryphus*.

The **Condor** (*Sarcorhamphus gryphus*) has usually been regarded as the largest of the birds of prey, but it is closely approached in size, if not indeed exceeded, by the California Vulture. Its length, according to Darwin, is about forty-eight inches, but it doubtless somewhat exceeds this, while the expanse of wings is variously given as from nine to twelve feet, with the probability of its rarely reaching ten feet. In color the male Condor is glossy black, with an ashy white bar across each wing. The base of the neck is surrounded by a large collar or ruff of snow-white down, above which is the bare portion covered with a wrinkled, dull red skin. "The forehead has a fleshy or cartilaginous comb or caruncle, the throat is wattled, and there is a large, pendulous wattle

on the upper part of the breast. The adult female lacks the comb, the wattles are smaller or wanting, there is less white on the wings, and the dark colors are duller than in the male." — BARROWS.

The Condor is found principally in the Peruvian and Chilean Andes, but it also ranges as far north as Bogota, and south to the mouth of the Rio Nigro on the east coast of Patagonia. According to the earlier observers, it was described as frequenting the loftiest peaks of the Cordilleras, reaching even the height of the vast Chimborazo, but later writers deny the truth of this, and state that it rarely if ever ascends above 16,000 feet, while the usual range is the zone lying between 9000 and 15,000 feet. The story of its ascending to these vast heights and then suddenly dropping in a few seconds to the level of the plains is more or less of an exaggeration, as are many of the accounts of its size and ferocity which early found their way into current belief. Thus a spread of wing of thirty feet to forty feet was not an uncommon estimate, but the clearness of the atmosphere and the absence of standards of comparison perhaps account for this erroneous impression, which even Humboldt was hardly proof against. As he saw them sitting on the lofty summits of the crags they "appeared truly gigantic," but in reality were less than four feet in length. So, also, the accounts of their killing sheep or even children and carrying them away to be devoured must be relegated to the chapter of myth and superstition, for the structure of the feet precludes the possibility of their grasping or carrying heavy burdens. They cannot even perch well on trees, but prefer a rocky ledge for a resting place.

FIG. 71. — King Vulture, *Gypagus papa*.

The Condor feeds largely on carrion, but is also fond of fresh meat and may occasionally kill old, very young, or injured animals, of goats, sheep, or does. Like the other Vultures, they gorge themselves with food when opportunity offers, and at such times are easily approached and lassoed by the Guachos. "The Indians who live in the high mountains often catch Condors by digging a hole in the ground sufficiently large for a man to hide in, over which they place a cow's hide, leaving only a small part uncovered down one side. Near this they place the carcase or part of an animal, and the man in hiding secures the Condors

by the legs as they settle. Still another way is to place a carcase in a fairly deep trench, from which the Condors are unable to take wing again." GOODFELLOW. They nest in the high, inaccessible fastnesses of the Cordilleras, selecting a ledge or shelf of rock, where, gathering together a few sticks or even on the bare rock, they deposit their two eggs. These are white, unspotted, and nearly four inches in length. The young when hatched are covered with a gray down, and require more than a year before being able to fly, and seven years before attaining mature plumage.

King Vulture. — The most brilliantly colored and striking of all is the King Vulture (*Gypagus papa*), which is found more or less abundantly over the whole of tropical America, except the West Indies, extending north into Mexico and possibly reaching southern Arizona. It is from twenty seven to thirty-four inches in length and has a spread of wings of about six feet. The "ruff" about the neck is lead-colored, the feathers white at base. The wings, wing coverts, rump, upper tail-coverts, and tail are black, the secondaries edged exteriorly with white, while the remainder of the plumage is vinaceous-buff or cream-color above and white beneath. The head and neck is described by Waterton as follows: "The throat and back of the neck are of a fine lemon-color; both sides of the neck, from the ears downward, of a rich scarlet; beneath the corrugated part there is a white spot. The crown of the head is scarlet, betwixt the lower mandible and the eye, and close by the ear there is a part which has a very fine silvery blue appearance. Just above the white spot a portion of the skin is blue and the rest scarlet; the skin which jets out behind the neck, and appears like an oblong caruncle, is blue in part and in part orange. The bill is orange and black, the caruncles on the forehead orange, the cere orange, the orbits scarlet, and the irides white."

The King Vulture is a bird of the forests, being found in the deep swamps, margins of stagnant marshes, and along the wooded banks of rivers, and is at all times a rare bird. It feeds on carrion and other food, such as young animals, after the manner of its larger relative. Much uncertainty appears to exist regarding its nesting habits. By some it is said to deposit the eggs in hollow trees and by others to build a large nest in tall trees; the eggs, however, appear to be two, and are white and unspotted.

THE SECRETARY-BIRD

(Suborder *Gypogerani*)

Beyond doubt the most remarkable, not to say anomalous, member of this group is the so-called Secretary-Bird (*Gypogeranus serpentarius*) of South Africa. It stands nearly four feet high, having very long but strong legs, and when seen stalking about might be mistaken at a little distance for a Heron or Crane, but a closer view discloses the unmistakable raptorial characters. It is light gray in color, with white streaks on the sides of the head and throat, while the wings,

rump, thighs, and abdomen are black, the breast and the tail-coverts white, and the long tail black at base, then paling into gray, and tipped with white, the two central feathers bluish gray. The bird has long and strong wings, but they are only used when pressed, as it prefers to escape by running, which it does

Fig. 72. — Secretary-Bird, *Gypogeranus serpentarius.*

with great swiftness. It takes its name from the series of long black or gray plumes which hang loosely and in pairs from the back of the head, these being likened to a bunch of quills stuck behind a clerk's ear. Their principal food consists of frogs, toads, and insects, and they are also very fond of snakes. The stomach of one examined by Le Vaillant contained "eleven rather large lizards, eleven small tortoises, a great number of insects, mostly entire, and three snakes as thick as a man's arm." The manner of capturing snakes is interesting. They incite the snake to strike, and then either avoid the blow by springing aside or into

the air or even receiving the blow on the stiff feathers of the wing, thus knocking the reptile down, when they spring on it. If the Secretary does not succeed in stunning it in this manner, he watches a chance, grasps the snake near the head, and flies to a considerable height, letting it fall on the hard ground. He then proceeds to swallow it.

The nest is said to be a bulky affair placed on a tree, or, when this is not available, on a bush. The eggs, two, or sometimes three, in number, are dull white, spotted with rust color at the obtuse end. "The young remain in the nest for a long while, and even when four months old are unable to stand upright."

The Secretary-Bird is frequently domesticated by the Cape farmers, and is said to make an interesting as well as useful pet, destroying many noxious insects, snakes, and other "vermin." One of the drawbacks in keeping it as a pet is its propensity for destroying poultry.

According to Count Salvadori the Secretary-Bird of the Soudan is distinct from the South African bird, but this view is not universally accepted.

THE FALCONS AND THEIR ALLIES

(Suborder *Accipitres*)

Having disposed of the two preceding more or less aberrant groups, we come to the principal suborder, that of the *Accipitres*. Although this suborder is plainly marked from the outside, there are perhaps few groups that have presented more difficulties in the way of a satisfactory arrangement of its various members. Originally these birds were mainly classified on external characters, and it was not until 1867, when Huxley published his Classification of Birds, that the subject was placed on a satisfactory basis of anatomical characters. Since that time additional facts have been accumulated which have enabled systematists to work out a more logical disposition of the *Accipitres*. One of the first of these was presented by Mr. Ridgway in 1875, and that his views as then expressed were sound is shown by the fact that practically identical results were reached by Mr. Pycraft in 1902. This problem has also been attacked by Dr. Suschkin, a distinguished Russian authority, and he too has arrived at similar conclusions, so that the present arrangement may be taken as the best expression now obtainable, although it differs quite widely from that accepted by many other students.

As already indicated, this suborder is logically divisible into two families, the *Falconidæ* and the *Buteonidæ*. As the characters on which this division is made are drawn from the skeleton, they are necessarily of a technical nature. The first family (*Falconidæ*) may be defined as follows: The vomer terminates anteriorly in a more or less conspicuous olive-shaped swelling, which is closely applied to the maxillopalatine processes; the palate is directly desmognathous, that is, of the "band type," while the nasal bones are almost completely ossified, the nostril being a small, usually circular opening; the scapular process of the coracoid is produced forward so as to meet the clavicle.

In the second family (*Buteonidæ*) the vomer is never expanded anteriorly and is more applied to the under surface of the maxillopalatine processes; the palate is indirectly desmognathous or schizognathous (of the "split type"), the nasal bones very incompletely ossified, and the nostrils large and without the bony tubercle; the scapular process of the coracoid is not produced forward, but is separated from the clavicle by a wide interval.

THE FALCONS, GOSHAWKS, CARACARAS, AND ALLIES

(Family *Falconidæ*)

The *Falconidæ*, according to Mr. Ridgway, may be logically and advantageously divided into four subfamilies, the *Falconinæ* or true Falcons, the *Polyborinæ* or Caracaras, the *Micrasturinæ* or the Tropical Goshawks, and the *Herpetotherinæ* or Laughing Falcons. The first three of these subfamilies are grouped together on the ground that the posterior toe is abbreviated, being very much shorter than the lateral pair, while the tarsi and toes are covered with small hexagonal scales which are larger in front. In the fourth subfamily (*Herpetotherinæ*) the posterior toe is elongated, in fact almost equaling the lateral pair, and the tarsi and toes are covered with uniformly thin, rough, imbricated scales. The *Falconinæ* and *Polyborinæ* agree in having the nostril a small, round or oblique opening, with a bony-rimmed margin and central tubercle, while in the *Micrasturinæ* the nostril is a large opening without either the bony-rimmed margin or central tubercle. In the *Falconinæ* the upper tomium is provided with a conspicuous tooth and the lower with a corresponding notch, and one or two of the outer primaries have their inner webs emarginated near their tips. The *Polyborinæ*, on the other hand, have the tomia without tooth or notch, and three or more of the outer primaries with the inner webs emarginated or sinuate near the middle portion..

Falcons. — We may appropriately begin the consideration of the first subfamily with the true Falcons, which form a very large group of nearly world-wide distribution. Ornithologists are not agreed as to the generic limits within the groups of Falcons, some placing them all in the genus *Falco*, which is the treatment here adopted, while others have separated them into several, of course closely related, genera. They are mostly medium-sized or large birds of stout, compact build and active habits. They have long, pointed wings in which never more than two primaries are emarginated. The middle toe is usually very long, never much shorter and sometimes longer than the tarsus, which is never with a single continuous row of transverse plates, either in front or behind. The bill is strong, broad at base, and the upper mandible provided with a very prominent notch and tooth.

The **Gyrfalcons** (Subgenus *Hierofalco*) form a striking group of large, closely allied Falcons,in which the middle toe is shorter than the tarsus, which is densely feathered in front and on the sides for the upper two thirds. A further mark of

distinction is found in the fact that only a single quill (the outermost) has the web emarginated. Of these birds we may first mention the White Gyrfalcon (*F. islandus*), a bird about twenty three inches long, which is found exclusively in the circumpolar regions. The adult is mainly white, but with the head and hind neck often narrowly streaked with dusky, and the upper parts more or less barred or transversely spotted with slate-dusky. It is an extremely shy bird, and when sitting with its pure white breast toward the intruder will often escape detection on the snow. It flies well, with rapid beats of the wings, followed by a short sail, and frequents rocky coasts where great numbers of water fowl are nesting, feeding largely upon them, as well as upon Ptarmigan and other birds. Our knowledge is at present rather limited as to its nesting habits, but so far as known the nest is usually placed on a rocky ledge. It was found by the Polaris Arctic Expedition near Cape Hays in latitude 70° 44′ north, where it was breeding on cliffs. The Gray Gyrfalcon (*F. rusticolus*) is a bird of the extreme northern portions of Europe, Asia, and North America, including Iceland and southern Greenland. It is slightly smaller than the last, and, while light colored, has the upper parts everywhere more or less distinctly barred with bluish gray and dusky. Its habits are similar to those of the white species, and similarly it nests on inaccessible cliffs along the seashore. The eggs are said to be three or four in number and creamy white, spotted and blotched with reddish brown.

Closely allied is the Gyrfalcon (*F. rusticolus gyrfalco*) of northern Europe and Arctic America from northern Labrador and the coasts of Hudson Bay to Alaska. It is a slightly darker bird than the last, while the Black Gyrfalcon (*F. r. obsoletus*) of Labrador is still darker. In winter this bird comes south to Canada, Maine, and New York, but it is common only in its northern home. Like the other forms mentioned this one also nests on high cliffs, the following description of a nest being from the pen of Mr. L. M. Turner, who found them nesting on the Chapel, an immense rock three hundred feet high with precipitous and nearly inaccessible sides, near Fort Chimo, Ungava. He says: "I went with a party of four to lower me over the cliff to secure the eggs which might remain in the nest. I descended to the nest. In front of it huge icicles stood joined with the slightly projecting roof above the ledge; some of these ice columns were two or three inches thick and four inches wide, forming an icy palisade around the edge of the nest and permitting approach to the interior only by a narrow space or doorway next the main wall of rock, and I was compelled to detach the ice before I could reach the four eggs I saw within the nest, which was composed of a few twigs and branches of larch and spruce, irregularly disposed on the outer side of the rim of the nest to prevent the eggs from rolling out, forming only a semicircular protection, while the rear portion was a part of the bare rock of the ledge. Below these twigs were the remains of former nests."

The **Prairie Falcon** (*F. mexicanus*) inhabits the western United States from the eastern border of the Great Plains to the Pacific, and from the northern boundary southward into Mexico. It is a bird from seventeen to twenty inches long, the adult being pale grayish brown above, indistinctly but broadly barred with pale clay-color or bluish gray, while the lower parts are white, with the flanks

heavily spotted or blotched with dusky. "The flight of this bird," says Fisher, "is swift and graceful, though in most cases it is carried on at no great distance from the ground. It is not a shy bird, except in sections where it has learned that man is its worst enemy." It is a typical plains bird and is found in the dry interior. The nest is usually placed on a shelf or niche in the perpendicular surface of a stream bank, a rocky ledge, or occasionally in hollow trees. They lay three or rarely four eggs, which are creamy white with blotches and spots of reddish brown. The Prairie Falcon feeds on birds, mammals, reptiles, and the larger insects, and does considerable damage in the way of destroying game birds, though this is perhaps more than offset by its destruction of injurious rodents.

Saker Falcon. —The last of this group that we shall have space to mention is the Saker Falcon (*F. cherrug*), a large, handsome bird ranging from southeastern Europe through central Asia to China and India. The male is about eighteen inches long while the female is much larger, reaching the length of twenty-four and one half inches. It has unusually long toes and claws, and has the plumage pale, earthy brown above, each feather margined with rufous, and aside from the pure white face and throat, the under parts are whitish streaked with brown. The tail is long, brown above, the feathers barred with whitish on the inner web, and ovally spotted with the same on the outer web. The head is pale rufous, sometimes bleaching nearly white. The Saker frequents open country, feeding in some parts of its range at least on large spiny lizards. The nest, a rather small affair, is placed in trees, and the eggs are said to be usually four in number. In certain parts of its range, notably India, where it is called the Cherug, and in Palestine, the Saker is trained for "hawking," being flown at gazelles, hares, cranes, etc.

The **Peregrine Falcon** (*F. peregrinus*) of Europe and portions of Asia may be taken as typical of another group (subgenus *Rhynchodon*) of Falcons, in which the tarsus is often shorter, and is never much longer, than the middle toe, while the first quill is longer than the third. This species, the male of which is about fifteen inches and the female eighteen inches in length, is dark bluish gray above, with darker bands, and decidedly darker head, while the lower parts are creamy buff or buffy white, barred and spotted with black. The quills are brownish black, edged with gray, and the tail-feathers grayish, broadly barred with black and tipped with white. The cere and feet are yellow and the iris dark brown. "This famed bird," says Hudson, "is of a handsome appearance, not Swallow-like as is the Kite, nor so massive as the Eagle, but nature in fashioning it has observed the golden mean, and the result is a being so well balanced in all its parts and so admirably adapted for speed, strength, and endurance that to many minds it has seemed the most perfect among winged creatures." Its trim, compact figure, as it stands erect and motionless on some projecting crag, make it appear as though "carved out of stone or marble of a beautiful soft tint." It has long, sharp-pointed wings and an exceedingly rapid flight, and as it possesses undaunted courage, it frequently pursues birds larger than itself, rarely failing to strike them down. It subsists almost entirely upon birds, such as Ducks, Waders, Pigeons, Grouse, Partridges, and, of course, such smaller species as come

in its way. It places its nest usually on a rocky ledge, but occasionally in trees, then often occupying abandoned nests of other birds, and it has been reported as rarely nesting on the ground in marshes. The nest may be a mere hollow scratched in the scant soil of a cliff, or it may be of considerable size. The eggs are from two to four in number, yellowish white, spotted and mottled with reddish brown and orange-brown. The Peregrine is still a not uncommon species in the British Islands, where it is confined to the rugged, rocky coasts.

Duck-Hawk.—In North America its place is taken by two subspecies, the Duck-Hawk (*F. peregrinus anatum*) and Peale's Falcon (*F. p. pealei*). The former, which differs from the Old World bird by the usually unspotted chest, ranges throughout the whole of America, south as far, at least, as Chile, and possibly finding its way into eastern Asia. It is found mainly in the vicinity of water, feeding largely upon water fowl and shore birds, but also taking hares, Ptarmigan, Grouse, Quail, Pigeons, and poultry. Of twenty stomachs examined by Dr. Fisher, "7 contained poultry or game birds; 9, other birds; 1, mice; 2, insects, and 4 were empty." Of their appearance on the wing, Major Bendire writes: "Its flight, when once fairly started in pursuit of its quarry, is amazingly swift; it is seemingly an easy matter for it to overtake even the fleetest of birds, and when once in its grasp, resistance is useless. I have seen this Falcon strike a Cinnamon Teal almost within gunshot of me, kill it apparently instantly from the force of the shock, and fly away with it as easily, or without visible struggle, as if it had been a sparrow instead of a bird of its own weight." That it also captures small birds is shown by the fact that remains of Robins, Thrushes, Catbirds, and Warblers have been found in its stomach, and Dr. J. G. Cooper says, "I have seen one pursue a Swallow, and turning feet upward seize it flying with perfect ease." It is, in fact, the terror of all birds from the size of a Mallard Duck down. The nest of this subspecies is usually placed on some projecting ledge or crag, often in an inaccessible position on the face of a cliff, or occasionally in a hollow tree. When in the former position it is composed of a few coarse sticks and twigs, just enough to prevent the eggs from rolling out. The two to four eggs are creamy buff, usually quite evenly overlaid with chocolate-brown, on which are blotches and spots of brown, rufous, or brick-red. The birds are much attached to the nesting site and return year after year, even when much persecuted, and they are also bold in defending their eggs or young, flying viciously at the intruder.

Peale's Falcon is found on the Aleutian Islands, from which point it extends west to the Commander Islands and south along the Pacific coast to Oregon. It differs from the two other forms in having the general coloration very much darker, and the chest heavily spotted with blackish. Its habits are similar to those of the other forms. In Chile and the Falkland Islands is found another ally of the Peregrine, namely, Cassin's Falcon (*F. cassini*), while in the Old World there are also a number of related species, among them being the Lesser Falcon (*F. minor*) of northeast Africa, which straggles as far south as the Cape, the Shahin Falcon (*F. peregrinator*) of the Indian peninsula, and the Black-cheeked Falcon (*F. melanogenys*) of Australia, so called from the deep brownish black

of the head, cheeks, and the back of the neck. This species, according to Gould, has the same courage and activity of its relatives in other parts of the world, being able to capture the White-eyed Duck, a bird twice its own weight. It nests in steep, rocky cliffs, laying but two eggs. The Hobby (*F. subbuteo*) of northern Europe and Asia is a bird which appears like a Lesser Peregrine, but has a softer plumage. It feeds largely upon dragon-flies and other insects, as well as the smaller birds.

Merlin. — As typical of another subgenus (*Æsalon*) of Falcons we may select the Merlin (*F. regulus*) of Europe and northern Asia, a bird one third less than the size of the Peregrine. The members of this group have the two outer quills with the inner webs emarginated near the tips, the tarsus not much longer than the middle toe, and the thighs longitudinally streaked, while the remainder of the plumage is mostly bluish gray above, the feathers with blackish central streaks, and whitish, buffy, or light rusty, striped with brownish, below.

The true Merlin is only about twelve or fourteen inches long, and may be known by the closed tail in the male showing but one black band, while the female shows about eight narrow pale bands. The upper parts are grayish blue, and the under parts reddish yellow, with longitudinal dark brown spots. It frequents the moors and mountains, feeding upon small birds, although it not infrequently kills Quail more than twice its own weight. The nest is a slight affair, usually placed on the ground among tall heather, and the eggs are four or five in number. Where it nests in trees, as it occasionally does, it makes use of the old nests of other birds, such as that of the Carrion Crow. It is capable of being trained for "hawking" and was formerly used to pursue Snipe, Larks, Blackbirds, etc.

Fig. 73. — Merlin, *Falco regulus*.

Pigeon-Hawk. — The nearest relative of the Merlin is the well-known Pigeon-Hawk (*F. columbarius*) of North America, which takes its name from its resemblance to the Wild Pigeon, this resemblance extending not only to the shape and poise, but to the rapid flight of this now rare bird. It is slaty blue above, with a broken collar of buffy on the neck, and creamy buff or ochraceous below, where, except on the throat, it is streaked with blackish. The closed tail is crossed by more than one black band. The Pigeon-Hawk is found throughout the whole of North America from the Arctic Ocean southward to the West Indies, Central America, and northern South America, breeding mainly to the northward of the United States except in the Rocky Mountain area, where it is a not uncommon summer resident. Its food consists mainly of small or medium-sized birds, insects, and occasionally small mammals. "Among insects the dragon-flies are favorite morsels for this Hawk, and the apparent ease with which it captures these nimble-winged insects demonstrates better than anything else its remarkable power of flight.

The nesting site is very varied. In some instances the bird deposits its eggs on a ledge or in a cavity on the face of a cliff, in others in the hollow of trees or in nests made among their branches, and occasionally in the deserted nests of other birds." -FISHER. These birds lay four or five eggs, which resemble in coloration those of the Duck-Hawk.

Other Species. - A darker race of the Pigeon-Hawk known as the Black Merlin (*F. c. suckleyi*) inhabits the northwest coast from California to Sitka, Alaska. Very little is known of its habits, and its nest and eggs have not been found. Richardson's Merlin (*F. richardsonii*) is a slightly larger and much paler-colored bird than the Pigeon-Hawk. It is found in the interior and western plains of North America, from the Mississippi River to the Pacific coast, and thence northward to British America, migrating southward in winter to Texas and Arizona. Like the Black Merlin, very little is known regarding its habits, though its nests and eggs are similar to those of the Pigeon-Hawk.

The **Aplomado Falcon** (*F. fusco cærulescens*), or Orange-chested Hobby, as it is sometimes called, is a handsome Falcon of Central and South America, which reaches the border of the United States in southern Texas, New Mexico, and Arizona. It is from fifteen to eighteen inches long, bluish gray above, with a broad stripe behind the eye, ear-coverts, chin, throat, and chest immaculate white, while there is orange-rufous on the occiput, and the lower parts are slaty blackish, narrowly barred with white, except the thighs and lower tail-coverts, which are light rufous or rusty. The wings and tail are blackish with transverse white bars, while the bill is yellow with a black tip, and the feet orange. In Argentina, where it is tolerably common, Mr. Hudson speaks of it as a poor spirited bird which "never boldly and openly attacks any bird, except the smallest species, and prefers to perch on an elevation from which it can dart down suddenly and take its prey by surprise." Its food consists of mice, small reptiles, grasshoppers, and insects of various kinds, and occasionally a small bird. It frequents in the United States the open plains, covered here and there with low mesquite trees, oaks, and cactuses. Its nest is usually the abandoned home of the White-necked Raven, and the eggs are apparently three in number.

Kestrels. — The small Falcons known as Kestrels form a group of nearly twenty species and are found with limited exception over the entire globe. They have the tarsus decidedly longer than the middle toe, and the sexes very different in coloration. The European Kestrel, or Windhover (*F. tinnunculus*), one of the commonest and best known of British birds, is from twelve and one half to fifteen inches long, the male lead-gray in color above, with the sides, under tail-coverts, and thighs light yellowish rufous, with narrow longitudinal streaks of black, while the female is light rufous or cinnamon above, spotted and barred with dark brown, the lower parts being similar to but paler than in the male. The bill is blue and the cere and feet yellow. The Kestrel gets its name of "Windhover" from its habit of stopping suddenly in its flight and remaining motionless suspended in mid-air on its rapidly beating wings, while it gazes intently at the ground. If it is correct in detecting its prey, it drops on it like a flash, but otherwise passes on, to repeat the process at frequent intervals.

Fig. 74. — American Sparrow Hawk, *Falco sparverius*.

It feeds largely on mice, occasionally on birds, and when opportunity presents on frogs, lizards, moles, and various insects. According to Seebohm, the Kestrel breeds in almost every part of the Palæarctic region, being common up to latitude 60° north, but farther north it becomes rapidly rarer, and north of the Arctic Circle it is only occasionally met with, while its presence in North America is

purely accidental. The nesting site is rather varied. It has perhaps a partiality for towers and lofty ruins, where it nests in company with Doves, Starlings, and Jackdaws, but it also nests in holes in rocks, hollow trees, and the abandoned nests of Crows or Magpies. The eggs are usually six in number, but range from four to seven. They have a reddish white ground on which is spread numerous blotches of a dull red. The Kestrel is an easy bird to tame, making a more affectionate and docile pet than most Hawks. Hudson in his "British Birds" gives an entertaining account of one owned by some friends. It was allowed full freedom and usually departed in early morning and returned in the evening, flying into the house and alighting on a statue or large picture frame. It was always present at dinner, sitting on the shoulder of one or the other of its owners, from whose hands it received bits of meat. It suddenly, however, developed extraordinary fits of ill temper, during which it would violently attack any one in the room, inflicting quite severe injuries.

Sparrow Hawk. — In North America the place of the Kestrel is filled by the so-called Sparrow Hawk (*F. sparverius*), which is probably the best known as well as the smallest and one of the handsomest of our Hawks. The male is about ten inches long and the female about twelve inches. The former is rufous above, usually with black bars or spots, and varies below from white to deep ochraceous, with or without black spots, while there are two black obliquely vertical bands on the sides of the head. The tail is chestnut-rufous, crossed near the end by a broad black band, while the wings are grayish blue, more or less spotted with black. The female may be known by having the tail, wings, and back crossed by numerous narrow bands of dusky and absence of grayish blue on the wings. The Sparrow Hawk is found throughout the whole of temperate North America, being an exceedingly common species throughout much of the West. It feeds exclusively on grasshoppers when these are obtainable, and may be seen in numbers perched on telegraph poles or other elevated points from which it sallies forth. The grasshoppers are taken in the talons and are handled with as much dexterity as a squirrel handles a nut. When these insects are scarce it feeds on mice, small snakes, and an occasional bird. It has the same habit as the Kestrel of hovering for a short space over a spot where it detects evidence of the presence of its prey. The nesting site of this Hawk is usually a hollow tree, such as the deserted nest of a large Woodpecker, or a natural cavity, and as a general thing is located at some distance from the ground; but in absence of suitable timber it may nest in holes in rocks, or in banks, using the abandoned burrow of the Kingfisher, and but rarely does it select a deserted open nest of such species as the Magpie or Crow. Still more rarely has it been known to take possession of a dove-cote. Such a case is reported by Mr. John H. Sage of Portland, Connecticut, who found a pair occupying one of four nesting compartments of a pigeon-box, the Hawks living in harmony with their neighbors. The number of eggs laid by these birds is usually four or five, although as many as seven have been recorded. They are mostly pale buff or cream-colored, with spots, blotches, and markings of different shades of brown. There are other interesting species, but we must pass them by.

Falconets. — Differing from the true Falcons very greatly in point of size, and structurally in having oval nostrils, are the curious little Pygmy Falcons, or Falconets (*Microhierax*), of the eastern Himalayas and Burma, and extending thence through the Malay Peninsula to Java, Borneo, the Philippine and Nicobar islands. The smallest of these is only five and one half inches long, and the largest is under seven inches in length, yet they have, it is said, all the spirit and dash of their larger relatives, not infrequently attacking and killing birds much larger than themselves. They have rather short wings, which are moved rapidly and continuously when in flight, and short bills, which are provided with a sharp tooth and a notch on either side. The Red-legged Falconet (*M. cærulescens*), the smallest species, is found from Nepal and Sikhim to Burma, Siam, and Cambodia. It is greenish black above and mostly chestnut below, with forehead, hind neck, and collar of white, while the wings and tail are black, barred, or spotted with white. This, and apparently other species as well, feeds largely upon dragon-flies, beetles, butterflies, and other large insects, and occasionally upon small birds and mammals. They nest in hollow trees, lining the bottom of the cavity with wings of insects. The eggs are white. The Black-legged Falconet (*M. fringillarius*) of the Malay Peninsula, Java, Sumatra, and Borneo is six and one tenth inches long, and is bluish black above, with the quills and tail black, barred with white on the inner web, and glossy black thighs, while the so-called White-legged species (*M. melanoleucus*) of Assam and Cachar is similar, but has the thighs and abdomen white.

Slightly larger than these, but otherwise quite similar, are the Falconets of the genus *Poliohierax*, which includes two species, one of which, the African Falconet (*P. semitorquatus*), a bird about seven and one half inches long, is found in southeastern and northwestern Africa, and the other (*P. insignis*) in the Indo-Chinese countries. Of the former Mr. Andersson, who found it in Damaraland, writes: "It is always met with in pairs and usually perches on bushes or on the lower or middle branches of small trees. I never saw it soar like other Falcons; it is not shy, and when disturbed it never moves farther than to the next conspicuous tree or bush. It feeds on small birds, mice, lizards, and coleopterous insects, the latter being, I apprehend, its chief food."

Carrion Buzzards. — The second subfamily, embracing the so-called Carrion Buzzards (*Polyborinæ*), is less numerous in genera and species than is the last, and may be known by having three or more of the outer primaries with their inner webs cut, with an oblique sinuation near the middle, while the third or fourth quills are longest and the first shorter than the fifth. Of the more technical characters it is unnecessary to speak, beyond the statement that the cutting edge of the upper mandible is without a distinct tooth or notch, the sides of the face are for the most part bare, and the toes connected by an interdigital membrane near their bases.

The Carrion Buzzards are all natives of the New World and are disposed in three genera and about a dozen species, only two of which reach the United States. They all have rather long legs, the members of two genera being chiefly terrestrial whereas the other (*Ibycter*) is entirely arboreal.

The **Caracaras** (*Polyborus*), of which four species are now known, may be regarded as typical of the subfamily, the characters of which have been set forth on page 212. They are rather handsome birds, from twenty to twenty-five inches in length, dark brown or blackish above, the cheeks, neck, chest, and tail-coverts soiled white, while the upper part of the back and breast are barred with whitish and dusky, and the tail white with numerous narrow bars of grayish or dusky, and a broad terminal or subterminal band of dusky. Audubon's Caracara (*P. cheriway*) ranges from the southern border of the United States south through Mexico (but apparently skipping parts of Central America) to Guiana and Ecuador. It is a rather shy bird, rarely allowing a close approach, and may often be seen "sitting for hours in an exposed place with ruffled plumage and half-spread wings exposed to the sun, for the purpose of absorbing the warmth of its rays." It is also often seen on the ground, where it walks easily and gracefully, and is able to catch agile insects by running after them. Its principal food consists of carrion, devouring greedily dead animal matter of all kinds, but it also feeds on lizards, snakes, frogs, young alligators, crabs, crawfish, insects, and occasionally small birds and mammals, being, however, especially fond of snakes. It has also been observed in the act of forcing Pelicans to disgorge their catch of fish, attacking them from above, darting down with shrill screams, and striking them with their talons. Sometimes they may catch the fish before they reach the ground, but usually they alight to enjoy the ill-gotten supplies. A correspondent quoted by Bendire, describing their hunting of other game, says: "I have seen them hunting prairie dogs, in couples, and once showing a high degree of intelligence. One was hidden behind a tussock of grass while the other danced before a young lamb, trying to lead it from the place where its mother was grazing to where its companion was hidden. The ruse was nearly successful, as the lamb began to follow, but the dam, anxiously watching, finally called it back." These birds also frequent the vicinity of slaughter-houses, but on the whole are regarded as inoffensive and even valuable for their work as scavengers and in destroying noxious animals and insects. They are peculiar in that they often carry their prey in the bill, the species to be next described being especially noted for this method of carrying. Their nests, which are sometimes used for several successive seasons, are large, rather slovenly made affairs, placed in a variety of situations according to the locality. In the river bottoms the nests are high up in the trees, but in the open country, "where there is a scarcity of suitable vegetation, it is placed in low bushes a few feet high." They are composed of small branches, weed stems, reeds, and coarse grasses, and shallowly lined with finer grass, leaves, Spanish moss, etc. The handsome eggs, usually two or three in number, are rounded ovate in shape, and mostly a uniform rufous-cinnamon in color, this being overlaid with irregular blotches

FIG. 75. — Caracara, *Polyborus cheriway*.

and spots of darker shades. Both male and female take part in the duties of incubation.

The **Carancho** (*P. tharus*) is a closely allied species found from Brazil and Amazonia throughout South America to the Straits of Magellan, being especially abundant in Argentina, where its habits have been extensively observed by Mr. Hudson, whom we have so frequently quoted. This species, while a carrion eater to some extent, appears to indulge in this diet only when it is unable to secure fresh meat, of which it is "amazingly fond." Like its relative it also feeds on a variety of things, such as frogs, lizards, and insects, but it is apparently more given to capturing birds and small mammals. It is frequently mobbed by the Lapwings, of which it usually takes little notice, but occasionally it apparently loses patience, and singling out a particular individual it gives chase, and no matter how the Lapwing turns or dodges the Hawk is close behind and in a few moments it is seized and borne screaming away. They are very quick to detect injured or ailing birds or mammals and several will often combine in an attack on such an one, but not infrequently they may single out an uninjured bird and "fly" it down. Mr. Hudson graphically describes such an attack on a White Egret by four Caranchos. These birds had alighted near a stream in which were numerous Gulls and Glossy Ibises and a solitary White Egret. "Presently one of them sprung into the air and made a dash at the birds in the water, and instantly all the birds in the place rose into the air screaming loudly, two young brown Caranchos only remaining on the ground. For a few moments I was in ignorance of the meaning of all this turmoil, when suddenly out of the confused black and white cloud of birds the Egret appeared, mounting vertically upward with vigorous measured strokes. A moment later and first one and then the other Carancho also emerged from the cloud, evidently pursuing the Egret, and only then the two brown birds sprung into the air and joined in the chase. For some minutes I watched the four birds toiling upward with a wild zigzag flight, while the Egret, still rising vertically, seemed to leave them hopelessly far behind. But before long they reached and passed it, and each bird as he did so would turn and rush downward, striking at the Egret with his claws, and while one descended the others were rising, bird following bird with the greatest regularity. In this way they continued toiling upward until the Egret appeared a mere white speck in the sky, about which the four hateful black spots were still revolving. I had noticed them from the first with the greatest excitement, and now began to fear that they would pass from sight and leave me in ignorance of the result; but at length they began to descend, and then it looked as if the Egret had lost all hope, for it was dropping very rapidly, while the four birds were all close to it, striking at it every three or four seconds. The descent for the last half of the distance was exceedingly rapid, and the birds would have come down almost at the very spot they started from, which was about forty yards from where I stood, but the Egret was driven aside, and sloping rapidly down struck the earth at a distance of two hundred and fifty yards from the starting-point. Scarcely had it struck the ground before the hungry quartette were tearing it with their beaks."

Of the two other known species of this genus, one is found in the Tres Marias Islands and the other on Guadalupe Island, Lower California.

Chimango Hawk. — Passing over the genus, *Phalcobænus*, with its four or five species, we may mention briefly the Chimango Hawk (*Milvago chimango*) as typical of another genus. This species, which inhabits the southern half of South America, is about fifteen inches long, buffy brown above and gray below, lighter on the rump and tail, and more or less barred or freckled with brownish gray. The legs are slender, the claws weak, and the bill only very slightly hooked. "It has," says Hudson, "an easy loitering flight, and when on the wing does not appear to have any object in view, like the Hawk, but wanders and prowls about here and there, and when it spies another bird it flies after him to see if he has food in his eye." They appear to be a strange conglomeration, presenting successively the life habits of a dozen species. "On the same day you will see one bird in violent Hawk-like pursuit of its living prey, with all the instincts of rapine hot within it, and another less ambitious individual engaged in laboriously tearing at an old cast-off shoe, uttering mournful notes the while. They are loquacious and sociable, frequently congregating in loose companies of thirty or forty individuals, when they spend several hours every day in spirited exercises, soaring about like Martins, performing endless evolutions, and joining in aërial mock battles. When tired of these pastimes they all settle down again, to remain for an hour or so perched on the topmost boughs of trees or other elevations; and at intervals one bird utters a very long leisurely chant, with a falling inflection, followed by a series of short notes, all the other birds joining in the chorus and uttering short notes in time with those of their soloist or precentor."

The Chimangos are strictly omnivorous, feeding as occasion presents upon carrion, offal, birds, small mammals, insects, frogs, and in times of scarcity upon a peculiar fungus which appears in the rain pools. They are constantly on the watch for the weak, the sickly, or injured among birds or other animals, which they quickly pounce upon and destroy, often acting in company. But while an inordinate lover of carrion, it has apparently discovered that this diet is unsuited to the tender stomachs of its young, hence these are fed almost exclusively on the young of small birds. An especial source of supply is the young of a small bird known as the Teru-reru (*Synallaxis hudsoni*), which builds a small domed nest in the dense tangle of low bushes. Although it is almost impossible for man to locate these nests, the Chimango apparently has little difficulty and must destroy incredible numbers. The nest of the Chimango is built on trees or bushes in swamps or on the ground among grass and thistles. The eggs, usually three or four in number, are nearly spherical in shape, and creamy white blotched with deep red in color. The location of the nest is easy to determine, as the parents when returning invariably utter a series of long mournful notes. When a nest containing young is discovered and visited by man, the old birds apparently always remove the young within a few hours to a place of safety,—a very rare practice among birds.

Red-throated Falcon. — One of the most remarkable members of the *Polyborinæ* is the Red-throated Falcon (*Ibycter americanus*), a bird of very striking

appearance on account of the bright red color of the naked skin of the face and throat, the plumage being glossy blue-black with the abdomen white; the bill and cere are yellow, the legs and feet deep coral-red. This is one of the noisiest birds of tropical America, its extremely loud call of *ca-ca-ca-cá-o* resounding through the forests or cultivated country, where bands of greater or less size rove about, much in the manner of the crows of other lands. On account of its peculiar call note the bird is known to the native by the name of *Cacáo*.

The Tropical Goshawks. — The subfamily *Micrasturinæ* comprises only the genus *Micrastur* with about eight species which range quite widely over Central America and northern South America. In addition to the characters already mentioned (p. 212), the *Micrasturinæ* have the tomia without tooth or notch, the sternum with a pair of large oval foramina in the posterior margin as in the *Falconinæ*, and four or more of the outer primaries with the inner webs sinuated near the middle portions. They are further described as stout and thick-set birds, with relatively long tails, short wings, and long legs, and a partial facial ruff, the latter suggesting the Harriers (*Circus*), though in general appearance they have more resemblance to certain of the smaller Goshawks, whence their popular name.

Of one of the Mexican species (*M. semitorquatus*) Colonel Grayson writes entertainingly as follows: "Among the great variety of Hawks to be met with in a single day's excursion in the vicinity of Mazatlan, none is so easily recognized as this peculiar and interesting species. I have only found it in the heavy forests or the immediate vicinity of a thickly wooded country, where its slender form and lengthened tail attract our attention as it swiftly glides through the tangled woods. It appears to be strictly arboreal in its habits, and possessed of wonderful activity, either in springing from branch to branch without opening its wings, or rapidly darting through the intricacies of the brush with apparently but little difficulty. I have seldom seen one of these Hawks in an open country, and have never seen one flying higher than the treetops where they are met with. Its wings are rather short, and its flight is performed by rapidly repeated strokes, only for a short distance at a time. It preys upon various species of wood birds, which it captures by darting upon them on the ground or in the bushes; but the Chachalaca (*Ortalis*) is its favorite game; this is a gallinaceous bird or wild chicken, about the size of, or lighter than, the common hen, and is entirely arboreal, seldom running upon the ground, but is able by its peculiarly formed feet to cling to, or spring rapidly through, the thickest branches with great agility; but this Hawk follows it with equal facility, until an opportunity offers to strike its prey, then both come to the ground together, the Hawk being the lighter bird. I witnessed a scene of this kind that took place when I was endeavoring to get a shot at a Chachalaca, as it was jumping about the very thick branches of an acacia, overgrown with lianes; it appeared to be in great distress, uttering its harsh notes of alarm, and spreading its fan-shaped tail; suddenly I saw one of these Hawks pounce upon it, when with harsh screams of terror the Chachalaca dragged his captor to the ground, where they struggled for a few

moments, but the unfortunate bird was soon overcome. . . . They build their nest of dry twigs and moss, which is placed in a very tall tree, but below the higher branches; the only nest I have seen was inaccessible, therefore I am unable to describe the eggs."

The **Laughing** or **Crying Falcon** (*Herpetotheres cachinnans*), as it is variously called in allusion to its peculiar notes, is not only the sole tenant of its genus, but is the only known member of the present subfamily *Herpetotherinæ*. In addition to the more technical characters, set forth on page 212, which serve to distinguish it from the other groups of the *Falconidæ*, it may be described as a sturdily built, crested bird, about eighteen inches in length, with a moderately strong bill and very strong, curiously reticulated legs and feet, on which latter account it resembles quite strikingly the Serpent Eagles of the Old World. The plumage is brown above the feathers with paler edgings, the crown forming a cap being buffy white with narrow shaft streaks to the feathers, while the feathers around the eye, hinder cheeks, ear-coverts, and a nuchal band are black, and the remaining parts, including a spot under the eye, cheeks, sides of the neck, and a neck collar and all lower parts, are buffy white; the wings are brown barred with blackish and have a conspicuous patch of creamy buff at the bases of the inner primaries, while the tail is alternately banded with dark brown and creamy buff; the bill is black and the cere and feet orange.

The Laughing Falcon is very widely and generally distributed from Bolivia and Paraguay northward throughout the whole country to southern Mexico, though not usually ascending very high in the mountains. It is an arboreal species and feeds upon reptiles, rodents, occasional birds, and grasshoppers. Its most marked peculiarity, which serves to call frequent attention to it, is its strange cry, which Leyland states may be heard for miles. Mr. Leon J. Cole, who has recently written of it as observed in Yucatan, says: "The usual note is a rather drawn-out cry, much like the human voice in distress; it sounds like 'Oh!' at a rather high pitch, and with a slight falling inflection at the end. This is repeated at short intervals. Occasionally it gives a series of these cries, increasing in pitch and volume somewhat, and becoming slower as it proceeds." Mr. Frank M. Chapman, whose observations were also made in Yucatan, adds: "The notes of this Hawk are more human and weird in character than those of any bird I have ever heard, . . . resembling a call of a man in great pain, and ending in an agonized wail. It was grewsome beyond description." The cries are given in the morning and again at dusk, and according to Dr. Richmond, who saw them on the Escondido River, Honduras, there is a curious guttural laugh which usually precedes the long call and which can be heard for only a short distance. From the fact that the bird calls most frequently about dusk, it is known as the "Rain-crow" by the Americans on the Escondido. Mr. E. A. Goldman, who has seen it in life throughout much of Central America, states that it is one of the most difficult and exasperating birds to procure, and after a patient stalk and the discharge of both barrels at it, it frequently is able to fly away with a wild laugh as though mocking the ill success of the shot! The nest and eggs of the Laughing Falcon appear to be undescribed.

THE KITES, BUZZARDS, EAGLES, HAWKS, AND ALLIES

(Family *Buteonidæ*)

The Kites, Buzzards, Eagles, Harriers, Hawks, and their allies, comprise the second of the two families (the *Buteonidæ*) into which the *Accipitres* are divided, and are disposed in some thirteen so-called subfamilies, the limits of which, however, are not sharp in all cases. The technical characters of the *Buteonidæ* have been given on page 212, and we may proceed to a review of the various groups, which are perhaps best ranked as subfamilies. Most of them are large birds, among them the largest of the whole group, and while there is hardly one without certain points of popular interest, lack of space will prevent the full description of more than representative members.

The Kites. — (Subfamily *Elaninæ*.) — A considerable number of accipitrine birds are known, and properly so, as Kites, since they possess at least the common character of lightness, ease, and grace on the wing that is the common property of but few birds. A more careful study of their structure, however, has shown that beyond this gracefulness of flight they are not all equally related. The so-called Kites of the genus *Elanus* may be regarded as typical of a subfamily, — the *Elaninæ*. The genus is of wide distribution, ranging over the whole of Africa, the Indian peninsula, the Indo-Malayan islands, and Australia, and in the New World from the southern United States over the whole of Central and South America. Five species are known, all small birds from twelve to sixteen inches in length. The tail is double-rounded and not deeply forked as in the true Kites, while the tarsus is naked in front and covered with minute roundish scales, and the claws are not grooved beneath as in some of their allies. The White-tailed Kite (*E. leucurus*) is the only American species. It is pale bluish gray above, becoming entirely white on head and tail, and pure white below, while the lesser wing-coverts and a spot in front of the eye are black. It is rather a rare bird in the United States east of the Mississippi, being perhaps most frequently met with in California, though nowhere abundant, while in many parts of South America it is a not uncommon species. It frequents the lowlands, where it may be seen beating back and forth over the surface of the ground, poising for a moment on rapidly beating wings as it scans the surface for its prey, on which it plunges with almost meteoric speed, or passes on in further quest. Of its habits in Argentina, Mr. Hudson writes: "It is a handsome bird, with large ruby-red irides, and when seen at a distance its snow-white plumage and buoyant flight give it a striking resemblance to a Gull. Its wing power is, indeed, marvelous. It delights to soar, like the Martins, during a high wind, and will spend hours in this sport, rising and falling alternately, and at times, seeming to abandon itself to the fury of the gale, is blown away like thistle-down, until, recovering itself, it shoots back to its original position. Where there are tall poplar trees these birds amuse themselves with outspread wings, each bird on a separate tree, until the treetops

are swept by the wind from under them, when they often remain poised almost motionless in the air until the twigs return to their feet. When looking out for prey, this Kite usually maintains a height of sixty or seventy feet above the ground, and in its actions strikingly resembles a fishing Gull, frequently remaining poised in the air with body motionless and wings rapidly vibrating." The food of the White-tailed Kite consists of snakes, lizards, frogs, mice, grasshoppers, and an occasional small bird. The favorite nesting site appears to be in live-oak trees, but other trees, such as cottonwoods and maples, are sometimes selected. The nest is usually well up from the ground, and composed of coarse sticks and lined with bark, straw, etc. In the United States the number of eggs in a set is usually four or five, whereas in Argentina the number appears to be eight. They are creamy white, heavily marked over their entire surface with irregular blotches and smears of dark blood red and claret brown. But a single brood is reared in a year, both parents assisting in the care of the young.

Black-winged Kite. -The best known Old World species is the Black-winged Kite (*E. cæruleus*), a much smaller bird than the last, being only a little more than thirteen inches long. It is ash-gray above, lighter on the head, and pure white below, a ring about the eyes and the lesser and middle wing-coverts black, while the tail is whitish on the upper side. It is further distinguished by having the cere, orbits, and feet yellow, the bill black and the irides carmine-red. This species ranges from southeastern Europe through Africa and India, being especially abundant in Egypt and many parts of India. They are described as bold, fearless birds, unconcernedly permitting a near approach of man, and often to be seen sitting on telegraph wires and the summits of tall trees. They are apparently somewhat gregarious, for Sharpe speaks of having seen in South Africa as many as nine in the branches of one tree. They utter, especially on the wing, a frequent and very piercing cry, and when in flight they are given to hovering over grass after the well-known manner of the Kestrel, the wings being held upward so that the tips are within three or four inches of each other while the feet and tail hang downward. They hold themselves for a few moments in this position as they slowly descend to within a few feet of the ground, when they drop suddenly. Their food consists largely of insects, but they also take small reptiles and birds when occasion presents. They build a large nest in low bushes or in the forks of a tree, and line it carefully with feathers and moss. In India it appears that two broods are reared in a year, although in other parts of their range it is doubtful if this condition prevails. The eggs are two or three in number, with a white or bluish white ground and irregular streaks and blotches of yellowish brown.

The **Letter-winged Kite** (*E. scriptus*) of Australia is so named from the fact that there is a black mark on the under surface of the wing, which, "following the line of the bones from the body to the pinion, assumes when the wing is spread the form of the letter V, or, if both wings are seen from beneath at the same time, that of a W, divided in the center by the body." It is the smallest species, being only twelve inches long, and is a delicate ashy white above, except for the coverts and a patch on the outside of the wing, which are black, and pure

white beneath. They are abundant in the interior of the country, always going in companies of from ten to thirty individuals, and even nesting in companies, as near as possible to one another. The nests are lined with the pellets ejected from their stomachs, these pellets being composed of the fur of the rats upon which they principally feed.

Andersson's Pern. — The only other bird of this subfamily that will be mentioned, and this but briefly, is Andersson's Pern (*Machærhamphus anderssoni*) of southwest Africa and Madagascar. It is a crested bird about seventeen inches long, chocolate-brown above, and white somewhat streaked with brown below, there being also a broad white line both above and below the eye. The bill is very thin and weak and the nostrils are half covered by the feathers of the lores. Comparatively little is known of the habits of this bird beyond the fact that it is probably crepuscular and feeds upon bats, which it is often seen in pursuit of at dusk.

The **Honey Buzzards** (*Pernis*), so called from their especial fondness for the comb and larvæ of bees and wasps, are typical of the second subfamily, — the *Perninæ*. They number five species, and are found exclusively in the Old World, where they range from Europe and northern Asia over Africa and India to Japan, the Philippines, Sumatra, Celebes, etc. They are distinguished at once by having the lores and sides of the head, as well as the forehead and chin, covered with small scale-like feathers, which are without bristles or bristly ends, this dense covering probably serving as a protection against the sting of bees and wasps. They are further distinguished by having a rather elongate but weak bill, which is not strongly hooked at the end. The tarsus is short, stout, and covered with small hexagonal scales, while the toes are long, covered above with bony shields, and provided with long, slightly curved claws, the middle one of which is somewhat dilated on the inner side. In the wing the third and fourth quills are subequal and longest.

The best-known Honey Buzzard (*P. apivorus*) is found in summer over Europe and western Asia, and in winter migrates to Africa, being only a rare or occasional visitor to the British Islands. It is about twenty-five inches in length, brown above, the feathers with slightly paler margins, while the head is ashy gray and the under parts white, narrowly streaked with brown. There is a very considerable amount of variation in the color and markings of the plumage, especially in birds of the first and second years. This species is said not to make its own nest, but to take possession of the abandoned nest of a Crow or Kite, which is relined with green leaves, preferably of beech, or with twigs with the green leaves on them. The eggs are two to four in number, with a creamy or pale red ground color, boldly blotched and spotted with purplish brown.

In the Indian peninsula, Ceylon, Burma, and other Eastern countries the place is filled by the Crested Honey Buzzard (*P. ptilonorhynchus*), a bird that is darker brown above, and is further distinguished by having a crest which is from one to four inches in length. It lives, according to Blanford, largely among trees, or is seen soaring above them, with a flight that is rather hurried

although it seldom flies far. It is not a shy bird, but is often found living and even nesting in wooded gardens and groves about houses. Its nest, which it appears to build for itself, is placed in the fork of a tree, and is made of small sticks and lined, like the nest of its relative, with green leaves. The eggs are usually two, although not infrequently there is but one. The Crested Honey Buzzard subsists principally upon the combs of bees, — eating honey, wax, and larvæ, — also the bees themselves, other insects, reptiles, and occasionally the eggs and young of birds.

The Bazas. — Much smaller and quite different in some respects from the last are the Bazas, although the points of resemblance to them are so important that they are regarded as belonging to the same subfamily. They have a very long nuchal crest, composed, however, of but few feathers. The bill is much shorter and stouter than in the Honey Buzzards, and besides being decidedly hooked at the end, has the upper mandible provided with two pronounced teeth or projecting angles. The wings are of moderate length and have the third or fourth quill longest. Some seventeen species are known, ranging from Africa and Madagascar through the Oriental region and parts of the Australian region. The Black-crested Baza (*B. lophotes*), a widely distributed species in Oriental countries, is mainly black above, with a white patch on the shoulders, and a white band across the smaller coverts, while the throat is white, the breast blackish, and the remainder of the lower parts buff with ferruginous cross-bars. It frequents the high-tree forests and is somewhat gregarious, although nowhere abundant. It feeds mainly on insects and an occasional lizard. Very little is known of its nidification. There is a handsome species in South Africa known as Verreaux's Cuckoo-Falcon (*B. verreauxii*), which is dark ashy gray above, somewhat shaded with brown, with the sides of the face, throat, and chest clear gray, while the breast is clear white conspicuously banded with pale rufous-brown; the tail is also banded. It is a rare, shy bird, frequenting the dense brush, and feeding on insects.

Swallow-tailed Kite. — Although there is perhaps some doubt as to the correctness of the reference of our Swallow-tailed Kite (*Elanoides forficatus*) to this subfamily, Mr. Pycraft is of the opinion that it should be so placed. In external form it certainly resembles the true Kites, but anatomically it is said to be quite different. It is a handsome bird, from twenty to twenty-five inches long, with the head, neck, entire lower parts, and a band across the rump pure white, while the back, wings, and deeply forked tail are polished black. It is found throughout the warm-temperate portions of continental America, coming north in the summer to Illinois, Iowa, and Minnesota, and along the Atlantic coast casually to Pennsylvania and southern New England. It is more or less gregarious, ranging in flocks of three to often a dozen or more. Dr. William L. Ralph, who had excellent opportunities of observing this species in Florida, wrote of it to Major Bendire as follows: "Excepting, perhaps, the Turkey Vulture, I think this bird is the most graceful of any while on the wing. It has the same easy floating motion, but at times it flies very rapidly and turns very quickly, which is something I have never seen the former birds do. Their motions are

Fig. 76. — Swallow-tailed Kite, *Elanoides forficatus*.

very 'swallow-like,' and that, with their forked tails, makes them look like gigantic Barn Swallows; and like the Chimney Swifts they have a habit of traveling together in small companies, usually consisting of three individuals, especially when they first return from the south. During the breeding season flocks consisting of from two or three to ten or twelve birds, but oftener of three, may

be seen following one another around, frequently uttering their call and circling in and out among the treetops so fast as to make one dizzy to look at them. Except during this season one seldom sees one of these birds unless it is flying, and I have often wondered if they did not at times sleep while on the wing. At least I know that they usually, if not always, eat while flying, for I have many times seen one sailing leisurely along, occasionally bending its head to tear a piece from a small snake that it held in its talons, and I have never seen one alight to eat its food, as other birds of prey do. Their food consists almost entirely of reptiles. Small snakes seem to be a favorite article of food with them. I never have seen one catch a bird, and believe they do not."

They nest mainly in the top of very slender pine trees, rarely below ninety feet from the ground and often as high as one hundred thirty feet. The nest is rather a rude affair of sticks and moss, and the eggs usually two in number, though three and rarely four have been found. The eggs are oval in shape with an ashy white or delicate cream ground color, spotted and blotched with different shades of brown.

The Ospreys. —(Subfamily *Pandioninæ*.) —There has been a great deal of discussion as to the proper systematic position of the Ospreys (*Pandion*), and even now their status can hardly be regarded as definitely settled. From the fact that they possess a more or less reversible outer toe, and also certain peculiarities in the skeleton, they were long held to exhibit a more or less distinct transition between the diurnal birds of prey and the Owls; but since it has been conclusively shown that the latter have little or nothing in common with the former, and have been removed to the midst of the so-called "Picarian" birds, a further examination of the various characters of the Ospreys has been necessary. According to Pycraft the outer toe is not more reversible than in ordinary *Accipitres*, and, all things considered, it seems likely that they find their closest relatives among the Honey Buzzards and their allies, being by some authorities, indeed, placed in the subfamily *Perninæ*, but it is perhaps best to regard them as constituting by themselves a distinct subfamily (*Pandioninæ*).

Ospreys, or Fish Hawks, as they are more commonly called in this country, enjoy an almost cosmopolitan distribution, being absent only from southern South America, New Zealand, Iceland, and some parts of Australia. They are so well known that an extended description is perhaps unnecessary, yet a few of the more important characters may be mentioned. When perching, the toes are disposed as in ordinary diurnal birds of prey, but when they capture a fish the toes are opposed in pairs, the outer toe being, as above pointed out, quite reversible. This reversibility permits of a very secure hold on their prey, which is usually an advantage, although, as will be shown later, the very security of the hold works occasionally to their detriment. The feet are large and powerful, the toes being unconnected and provided with very large, strongly curved claws, which are of equal length, and narrowed and rounded on the under sides. The whole of the rather short tarsus and the toes are covered with rough, somewhat imbricated, projecting scales, and the under surface of the toes is covered with quite prominent pointed spicules, — an adaptive character, found

also in other piscivorous *Accipitres*, as for example the genus *Busarellus*. The plumage, while close and compact, is without aftershafts, thus agreeing with the Owls. The bill is inflated, the cere depressed, and the nostrils not concealed by bristles. They have long, pointed wings in which the coverts as well as the primaries are very hard and stiff. In color the Ospreys are dark brown or grayish brown above and mainly pure white below, with slight variations in the various races. The length is from twenty-two to twenty-five inches and the spread of wings about five feet.

Some three or four species of Ospreys have been described, but it is now generally recognized that there is but a single species, which in different parts of its range has assumed sufficient differences in size and plumage to warrant being separated as more or less well marked subspecies. The principal or central form is the European Osprey (*Pandion haliaëtus haliaëtus*), which is found throughout the Eastern Hemisphere and has the breast always spotted with brownish. The next in importance is the American Osprey (*P. h. carolinensis*), found throughout temperate and tropical America in general, except in the Bahamas, where there is a local race sometimes recognized as the Bahama Osprey (*P. h. ridgwayi*). The first has the breast usually entirely without spots, while the latter is a smaller form with the back paler than in the American Osprey, and the bill much larger and more swollen. The smallest of all is the Australian Osprey (*P. h. leucocephalus*) of Australia and the Indo-Malayan islands.

Habits. — Inasmuch as the habits of the Ospreys are much the same wherever found, the following account will largely be that of the American form, which is a familiar bird to those who dwell near the ocean or large inland bodies of water. In the more northern part of its range the Fish-Hawk is migratory, coming in the early spring as the first harbinger of the breaking up of winter, the males preceding the females by several days. They spend the winter mainly in the Southern States, greatly augmenting, at that time, the number that remain there the year around. These birds are much attached to their homes and return year after year to the same nest, where if unmolested they rear an annual brood. Like certain other birds of prey they are supposed to mate for life, and many are the stories told of their devotion to each other. One particular incident may be cited. A pair of Fish-Hawks had their nest in a tall locust tree. "At a time when one of the birds, presumably the female, was on the nest, a bolt of lightning struck the tree, killing the bird and demolishing the nest. Strangely enough, the other Osprey, when returning only to find his home desolated, took up his station upon the top of one of the uninjured trees close at hand, and throughout the remainder of the summer, was seen day after day, month after month, keeping his lonely vigil, apparently mourning the loss of his mate. By those who lived in the vicinity it was asserted that he was never missing from his post; and many were the speculations indulged with regard to the manner of his subsistence. Some inclined to the opinion that he went fishing very early in the morning and so escaped observation; while others supposed him to have been fed by other Fish-Hawks who took pity on his lonely state."

Fish-Hawks are very peacefully inclined birds. So tolerant are they at the presence of other birds that they permit Grackles and Night Herons to nest unmolested in the interstices of their great nests. They subsist almost entirely on fish, which they capture themselves, and only when hard pushed by hunger will they take dead fish. Occasionally they may kill another bird, and in some parts of their range, especially in the lower Mississippi Valley, they seem to be particularly fond of snakes. The kinds of fish taken are apparently of little moment to them, but they are principally those species which come near to the surface. Along the coasts they take shad, alewives, menhaden, and mullets, while in inland waters suckers, catfish, salmon, trout, and white perch form perhaps the chief items of diet. Their manner of fishing is rather peculiar, and quite different from that pursued by other fish catching birds of prey, or even of fish-catching birds in general. One may be seen winging its way slowly over the water, keeping a keen watch for any fish that may be near the surface. "When one is observed," says Mr. Frank M. Chapman, "it pauses, hovers a moment, and then, closing its wings, descends with a speed and directness of aim that generally insure success. It strikes the water with great force, making a loud splash, and frequently disappears for a moment before rising with its prey grasped in its powerful talons." The manner of descent has been further described by Mr. Paul Bartsch, who says: "The Osprey shifts its center of gravity when it passes above the water as does the Kingfisher, whose body changes almost to a vertical from the horizontal position as he prepares for a plunge. Neither does the Osprey dive head first as does the Kingfisher; but he plunges into the water with wings extended widely upward, clutching his prey with his powerful outstretched talons." It has been known to strike the water with such force as to break a wing, and quite a number of cases are on record of their striking a fish too large for them to handle, and being unable to loosen their claws, have been drawn under and drowned. Curiously enough they always carry their prey head first, and if captured in another position they are said to turn it around in mid-air. As soon as they secure a fish they start for the land, and if not robbed of it by a watchful Eagle, resort to a particular spot, where it is devoured at leisure. Wherever food is perennially abundant the Fish-Hawks often occur in colonies of several hundred, but in other localities less favored only one or two pairs are found. I have seen a dozen nests within a short distance along the Yellowstone Lake, the birds apparently feeding on the trout so abundant there.

The nesting site selected by the Fish-Hawk is extremely varied, although usually it is a tall tree, especially one that has the top or a large limb broken out by a storm. In some localities, as for example Plum Island, New York, where the birds are protected, they build the nest on low trees, on chance piles of rails, or even on the ground. "The most picturesque nesting site of the Osprey I ever saw," says Bendire, "was located in the midst of the American Falls of Snake River, Idaho. Right on the very brink of these, and about one third of the way across, the seething volume of water, confined here between frowning walls of basalt, was cleft in twain by a rocky obstruction which had

so far withstood the ever eroding currents, and this was capped with a slender and fairly tapering column of rock rising directly out of the swirling and foaming whirlpool below. On the top of this natural monument, whose apex appeared to me to be scarcely two feet wide, a pair of Ospreys had placed their nest and were rearing their young amidst the never ceasing roar of the falls directly below them." The nest is ordinarily composed of large sticks, brush, and rubbish of various kinds, such as cornstalks, seaweeds, etc., and lined with cedar bark and other finer material. At first it is of small size, but it is added to year after year, and finally assumes large dimensions, being sufficient in some cases to make several cart loads. The birds are brave in defense of the nest, flying at an intruder and uttering shrill screams. The number of eggs is usually two or three, rarely four, and they show great variety in both shape and color. Sometimes they are white and unmarked, occasionally an almost solid chocolate, but mainly they are a buffy white more or less heavily marked with various shades of brown.

The Kites and Sea Eagles. — (Subfamily *Milvinæ*.) — At first sight it seems a rather strange assemblage to place the true Kites in the same subfamily with the great Sea Eagles, but in spite of obvious external differences the anatomical characters seem to warrant placing them together, while at the same time the extreme forms are connected by others of intermediate characters. It is said that the name of Kite should properly be restricted to the genus *Milvus*, and even further than this to a single species, — the Common Kite of Europe (*M. milvus*). This genus is a small one, embracing but six species, all confined to the Old World, being birds of moderate size with long, pointed wings and long, forked tails, the outer feathers of the tail being longest. They have relatively a rather weak bill, the culmen straight at base, then curved, and without any notch, while the tarsus is short and the feet provided with sharp, often quite long claws. They are birds of strong but graceful flight, and may often be seen sporting in the air much after the manner of Swallows.

The **Common Kite**, or **Glead** (*M. milvus*), is a more or less abundant bird of central and southern Europe, and was once a familiar sight in the British Islands and even in the streets of London, but owing to ceaseless persecution it is now confined as a breeding bird to a few pairs in Scotland and Wales. It is about twenty-five inches in length, with the upper parts reddish brown, the feathers with pale edges, those of the head and neck being grayish white streaked with brown. The under parts are rust-colored with longitudinal streaks of brown. The female is similar, but has the upper parts a deeper brown and the head and neck white.

Hudson says the Kite is one of the finest of the diurnal birds of prey: "The great extent of his sharp-pointed wings and his long, forked tail fit him for an aërial life. In appearance he is a swallow-shaped Eagle, and few birds equal him in grace and majesty of motion when he soars at a vast height. Like the Eagles, Buzzards, and other strong fliers among the raptores, he soars for exercise and recreation, and, vulture-like, when soaring he is ever on the watch for a meal, and, vulture-like, he will feed on garbage, for though of so noble an

appearance, and possessed of great power, he has, compared with the Falcons, a poor spirit, and his name is a term of reproach that signifies cowardice and rapacity. A carrion-eater, he also preys on small mammals, reptiles, and birds, in most cases the young, the sickly, or wounded." The nest is a bulky affair of sticks and rubbish placed in a tree or a ledge on a rock. The eggs, two to four in number, are much spotted with brown.

Black Kite. — Another widely distributed species is the Black or Migrating Kite (*M. migrans*), which is found in central and southern Europe, central Asia, and southward in winter over the whole of Africa. It is a little smaller than the Common Kite and is easily distinguished by its much darker color above and by the dark brown, indistinctly barred tail. It is an active bird, filling the place of a scavenger in many places, gaining most of its food from refuse heaps, offal from slaughter-houses, and an occasional fowl. It nests in the tops of palm trees.

The **Arabian Kite** (*M. ægyptius*), which extends over the whole of Africa and Madagascar, and thence into southeastern Europe, Greece, and Dalmatia, is quite similar to the Common Kite, being distinguished among other characters by the brown, black-barred tail and bright yellow cere and bill.

The **Pariah** or **Govind Kite** (*M. govinda*) replaces the black species in the Indian peninsula and the Himalayas; while another and larger species (*M. melanotis*) ranges from the Indian peninsula through Japan and China to Formosa. The former is a great scavenger, frequenting the streets of cities and towns, while the latter is a shyer bird, keeping more to the jungles.

The **Everglade Kite** (*Rostrhamus sociabilis*), which is found from Florida through tropical America to Argentina, is a form of very doubtful relationships, but by some authorities has been placed here. It is a dark slate-colored bird about eighteen inches in length, and subsists almost entirely on snails, whence it is often called the Snail-Hawk.

The Sea Eagles. — We may next consider the Sea Eagles, a magnificent group of some seven or eight species that are fully the equal in size and appearance, if not indeed the superiors, of the true Eagles. They are at once distinguished by having the lower third of the tarsus naked all round, and are further characterized by the lanceolate feathers on the whole head and neck. They possess a long, very powerful, strongly hooked bill and enormously developed feet, which are armed with strong, curved claws. The genus (*Haliaëtus*) is distributed throughout the entire world except South America, two species and one or two local races being natives of North America.

Bald Eagle. — One of the noblest of the species is the Bald Eagle, or White-headed Sea Eagle, as it is sometimes called (*H. leucocephalus*), chosen as the national emblem of the United States. It is almost too well known to need description, as it is a not uncommon sight throughout the whole North American continent, being, moreover, especially abundant in Florida. The adults are uniform dusky brown throughout, except the head and neck, tail and tail-coverts, which are pure white, in sharp contrast to the rest of the body. The males are from thirty to thirty-five inches in length, with an extent of wings of about seven

feet, while the females are from thirty-four to forty-three inches in length and have a spread of wings of between seven and eight feet.

It is quite commonly supposed that the Bald Eagle is more or less of a robber and tyrant, feeding largely on fish stolen from the Osprey, and on carrion, but this, according to that most excellent of authorities, Major Bendire, is not strictly true. He says: "According to my observations the Bald Eagle lives, to a large extent at least, on prey captured by its own exertions, principally on wounded water fowl. When employed in the chase of a flock of Geese, Brant, Ducks, or other water birds, it is by no means the sluggish, lazy bird some writers would make us believe, but the peer in swiftness, dash, and grace of any of our Raptores." They nest principally in the vicinity of the sea or some large body of water, placing the nest usually on a large tree. "The nests," according to Dr. Ralph, who writes especially of their habits in Florida, "are immense structures, from five to six feet in diameter and about the same in depth, and so strong that a man can walk around in one without danger of breaking through. They are composed of sticks, some of which are two or three inches thick, and lined with marsh grass or some similar material." The eggs are usually two in number, though occasionally one and quite rarely three are found. They are uniformly white, without markings, and about three inches long by two and one fourth in short diameter. The young appear to remain for several months in the nest.

FIG. 77. — Bald Eagle, *Haliaëtus leucocephalus.*

The Bald Eagle displays great fondness for its home, and while it may not often actually attack an intruder, even when robbed of eggs or young, it returns again and again to the same site; and when one of the pair is killed, the other apparently invariably secures a new mate and resorts to the same nest. Of the local races above mentioned, one (*H. leucocephalus hypoleucus*) is found on Bering Island, and the other (*H. l. alascanus*) in Alaska.

The **Gray Sea Eagle**, or **White-tailed Eagle** (*H. albicilla*), also a bird of magnificent size, is found mainly throughout the western portions of the Eastern Hemisphere, and can only lay claim to being North American from its occasional presence in southwestern Greenland. It is distinguished from the former species by the head and neck being a light grayish brown or brownish gray instead of white, and the general coloration less dark. This species formerly nested in England, but they now no longer breed on the mainland, and only one or two pairs are known to inhabit even the outlying islands. It has, says Hudson,

a more varied dietary than the Golden Eagle, hunting for food both on sea and land. "Like the Osprey, he drops from a considerable height on to a fish seen near the surface, and, striking his talons into it, bears it away to land. But he preys more on Puffins, Guillemots, and other sea-fowl, than on fish. He destroys mountain hares, Grouse, and Ptarmigan, and is regarded by the shepherd as the worst enemy to the flock." The nest is usually in cliffs by the seashore, and the eggs are similar in number, size, and color to those of the Bald Eagle.

Other Species. — Inasmuch as the habits of the various Sea Eagles are mainly identical, the present account of the group may be concluded with a brief enumeration and description of the remaining species. Pallas's or the Ring-tailed Sea Eagle (*H. leucoryphus*), which ranges throughout southern and central Asia as far west as the Persian Gulf, the Caspian and Black seas, and is abundant in northern India and Burma, is a smaller species, the male being about thirty and the female thirty-three inches in length. It may be known by having the sides of the head and neck with the chin and throat whitish, but especially by a white band about four inches wide across the tail, some three inches from the end, whence one of its names mentioned above. It frequents mainly the large rivers, tidal creeks, lakes, and marshes rather than the seacoasts, and feeds largely on fish, with occasional water-birds, frogs, snakes, etc. Still smaller is the White-bellied Sea Eagle (*H. leucogaster*) of the coasts of India, Ceylon, and Burma, whence it extends throughout the Malay Archipelago to Australia, Tasmania, and western Polynesia. The head and neck all around, as well as the lower parts and the terminal third of the tail, are white. This species occurs on the coasts, being rare inland, and feeds chiefly on fish and sea-snakes. The African Sea Eagle (*H. vocifer*) has the head, breast, and the top of the back and tail pure white, while the wings and back are nearly black, and the abdomen and thighs reddish brown. It is found in tropical Africa, frequenting the mouths of rivers, lakes, and other suitable places, feeding on fish, crabs, reptiles, and now and then a young lamb. Somewhat smaller than this is the Madagascar Sea Eagle (*H. vociferoides*), which differs from it by having the under parts brown and the lower wing-coverts chestnut.

Steller's Sea Eagle (*Thalassoaëtus pelagicus*), which occurs in Kamchatka in summer and Japan in winter, is another giant species which is referred by some to the preceding genus, and by others placed in a genus by itself, differing, among other characters, in having a wedge-shaped tail of fourteen instead of twelve feathers and an enormous bill. The plumage of the adult is brownish throughout, with the wing-coverts, rump, tail, and tail-coverts pure white, while the young are nearly brown throughout, only the tail being white. The full-grown bird is about forty-one inches long. The Korean Sea Eagle (*T. branicki*), a native mainly of Korea, is also a very large bird. It is a uniform slaty black, without white on any part of the body, and in correspondence with its gigantic size has a very loud, penetrating cry.

The Fishing Eagles. — It is probable that the so-called Fishing Eagles (*Poliaëtus*) should also be referred to this subfamily, but there are very decided

differences of opinion among ornithologists on this point. As the Fishing Eagles have a partially reversible outer toe, they have been placed with the Ospreys, but anatomically they agree with the Eagles, and, moreover, the feathers have an after-shaft, which the feathers of the Ospreys do not. It seems safe to say that they are at most only distantly related to the Ospreys, but the exact position they shall occupy is perhaps open to question. They are smaller than most of the Sea Eagles, ranging from twenty-four to some twenty-nine inches in length, and have a shorter bill but similar oval nostrils. The wings are rounded, the fourth and fifth quills longest, and the tail of moderate length and slightly rounded. The feathering of the tarsus is also similar, though the scales on the naked portion are larger, and the claws stronger and much curved. The plumage is mainly brown above, becoming ashy or ashy gray on the head and neck, while the breast is ashy and the abdomen and under tail-coverts white, as is the basal portion of most of the tail-feathers. They are mainly inland birds, preferring wooded rivers and lakes to the sea coast, and have, it is said, a " peculiar deep resounding call, repeated three or four times." They live chiefly on fish, which they swoop upon in their flight, not pouncing down upon them like an Osprey, and they may occasionally take a wounded bird. The nest is a very bulky structure of sticks and usually placed in a high tree, while the eggs, two or three in number, are white and unspotted. The Oriental or Gray-headed Fishing Eagle (*P. ichthyaëtus*) is widely distributed over the Indian peninsula, Ceylon, and through the Malay Peninsula to the Celebes and Philippines, while Hogdson's Fishing Eagle (*P. humilis*) ranges through the Burmese Provinces, Malay Peninsula, Sunda Islands, and Philippines. A recently described species is found from the Himalayan districts to Assam.

The True Eagles. — (Subfamily *Aquilinæ*.) — It is perhaps unnecessary to state that the Eagles form a large group of magnificent, usually large, powerful birds of practically cosmopolitan distribution. They are comprised in several genera and forty or more species, and naturally the genus giving name to the subfamily is taken as typical. In the genus *Aquila* the bill is strong and curved from the vicinity of the cere. The wings are long, with the fourth and fifth quill longest, while the tail is of moderate length and slightly rounded or nearly even; the tarsus is feathered to the toes, thus differing from the Sea Eagles, and the toes are strong and provided with strongly curved, very large and sharp claws.

Golden Eagle. — We may appropriately begin the consideration of this group with the Golden Eagle (*Aquila chrysaëtus*), which is found in North America as far south as Mexico, and also in various parts of Europe and northern Asia, whence it ranges to northern Africa and China. The male is from thirty to thirty-five inches in length and has an extent of wings of between six and one-half and seven feet, while the female is four or five inches longer and has a spread of wings of between seven and seven and one-half feet. In color the Golden Eagle is a nearly uniform dark brown, with the lanceolate feathers of the hind-neck and the feathers of the tarsus of a paler or more tawny hue, while the tail and quills are black, the former being more or less clouded or irregularly banded

Fig. 78. — Golden Eagle, *Aquila chrysaetos*.

with grayish. The young are much paler or even whitish, especially on the under parts and the tail.

From time immemorial this Eagle has been taken as the emblem of all that is noble and courageous, but as so many of our cherished ideals have been shattered in the cold light of truth, so must our estimate in this instance give way before undeniable facts. On this point Major Bendire says: "Notwithstanding the many sensational stories of the fierceness and prowess of the Golden Eagle, especially in defense of its eyrie, from my own observations I must confess, if not an arrant coward, it certainly is the most indifferent bird, in respect to the care of its eggs and young, I have ever seen." In spite of this, as Bendire continues, it "is a clean, trim-looking, handsome bird, keen-sighted, rather shy and wary at all times, even in thinly settled parts of the country, swift of flight, strong and powerful in body, and more than a match for any animal of similar size." Never very abundant, it has now probably disappeared almost entirely as a nesting species east of the Mississippi River, although an occasional pair may linger in the more mountainous portions of the Adirondacks of New York, the New England States, etc. Beyond the Mississippi it is quite generally distributed, becoming fairly common in the interior Rocky Mountain region. The story is the same on the other side of the Atlantic, for while it once bred in England and Wales, it has gradually retreated farther and farther north, and is now restricted during the nesting season to the Highlands and western islands of Scotland. In other portions of Europe and Asia it is still fairly common. The nesting site is usually selected in some wild and inaccessible place, as a rocky ledge, a perpendicular bluff on the bank of a stream, or, these failing, a large tree. The nest is a bulky affair of large sticks and is often used for many years. One found by Major Bendire near Camp Harney, Oregon, "situated in a large pine tree close to the trunk and about fifty feet from the ground, was three and one half feet high by three feet wide. It consisted of large sticks, some of them over two inches in diameter, and was sparingly lined with bits of juniper bark, pine needles, and green fir tops, evidently broken off by the birds." A nest described by a correspondent of Bendire's must have contained two wagon loads of material and was over seven feet high and quite six feet wide on its upper surface. The eggs are generally two, rarely three, in number, being two and one half to three inches long, of a dirty white ground-color, and usually thickly blotched and spotted with various hues of brown and purplish. The food of the Golden Eagle consists largely of prey captured by itself, though it does not entirely disdain animals killed by another, and under stress of circumstances will even feed on carrion. This latter condition appears to prevail more among the Old World representatives of the species, whereas in America their food consists of small mammals, birds of various kinds, and an occasional young lamb. The following graphic account of the capture of a jack rabbit by a pair of Golden Eagles is given by Mr. W. L. Atkinson: "The Eagles circled about him at a height of about thirty feet; first one would swoop down on the rabbit and then the other, but the result was always the same, for the rabbit was quick enough to dodge just as the birds struck at him. The chase was

nearing the fence, and it seemed if the rabbit could succeed in reaching it, he could, by dodging around among the trees, baffle his pursuers. The Eagles seemed to know this also, for when within fifty yards of the fence, the larger one of the two swooped down at the rabbit, and when he dodged, the Eagle pursued him, flying at a height of about three feet above the ground. The rabbit redoubled his speed and made straight for the fence, the Eagle following and both doing their best. This unequal race was kept up until the fence was reached, the Eagle having gained until she was but two or three feet behind the rabbit. When the rabbit passed through the fence, I expected to see the Eagle give up the pursuit, but she had no intention of doing so, for without slacking her speed she raised herself just enough to clear the fence, and, dropping down behind the rabbit, continued as before. Instead of dodging around among the trees he was so crazed with fear that he ran in a straight line down the orchard. The velocity with which the Eagle flew at this stage of the chase was something wonderful. Fast as the rabbit ran, the 'great black shadow' behind him drew nearer and nearer, until, poising an instant over its victim, the Eagle pounced upon him. A short struggle, a cry or two from the rabbit, and all was still."

The **Spotted Eagle** (*A. heliaca*), which is distributed from southeastern Europe to central Asia, northern India, and China, is sometimes mistaken for the species just described, but it is a smaller bird, with less difference in size between the sexes, and further the adults may be separated at once by the presence of a more or less conspicuous white patch on the shoulders. It is a rare and occasional visitor to the British Islands, but breeds rather abundantly in the forests of central and southeastern Europe. In India, Blanford describes it as a sluggish, heavy bird, often seen sitting on trees or sometimes on the ground in open country. During the winter season it throngs the well-wooded and cultivated portions of the plains of continental India, but goes farther north and west to breed. It feeds largely on carrion, although it also kills small mammals, birds, and lizards. Like the other Eagles it constructs a bulky nest of large sticks, placing it usually in a tree, and lining it with a few green leaves. The eggs, two or three in number, are variable in size and shape, and are pale grayish white and unspotted, or occasionally with purplish brown blotches.

Other Species. — In southeastern Europe and northern Africa this species is replaced by Adalbert's Eagle (*A. adalberti*), which is a slightly smaller species in which the white shoulder patches continue along the edge of the wing to the carpus; its habits are similar. The Steppe Eagle (*A. bifasciata*), which was formerly regarded as a color phase of the Imperial Eagle, is a bird about thirty inches long, nearly uniform brown in color, with often a rufous-buff patch on the nape. Its habits are similar to those of the Imperial Eagle, except that it usually places the nest on the ground. Allied to the last, but much smaller, is the Indian Tawny Eagle (*A. vindhiana*), a common bird of the Indian peninsula. It feeds on small mammals, birds, lizards, and carrion, and is also guilty of robbing Kites and Falcons of their captures. Other species found in India are the rare Brook's Eagle (*A. fulvescens*), and the Large and Small Spotted Indian

Eagles (*A. maculata* and *A. hastata*), while Africa is the home of several fine species, as Verreaux's Eagle (*A. verreauxi*) of northeast and South Africa, the Tawny Eagle (*A. rapax*), and Wahlberg's Eagle (*A. wahlbergi*).

Wedge-tailed Eagle. — In Australia and Tasmania there is a large, powerful Eagle that was formerly associated with the true Eagles, but which is now separated from them mainly on account of the fact that the tail is strongly wedge-shaped, when closed the middle pair of feathers exceeding the others by more than the length of the tarsus. The Wedge-tailed Eagle (*Uroaëtus audax*), as it is appropriately called, is about thirty-eight inches long and is, in the adult, mainly blackish brown in color, with the edges and extremities of the feathers stained with pale brown, while the back and sides of the neck are rusty reddish. The young have all the feathers of the upper parts tipped and stained with rusty, while the head and back are deep fawn-color and the breast and throat blackish brown. It frequents the plains and open crowns of the hills, and while it feeds mostly upon living prey, such as small mammals and birds, it is also fond of offal and carrion, and Gould mentions the fact that he once saw thirty or forty individuals assembled around the carcass of a dead bullock, "some gorged to the full, perched upon the neighboring trees, the rest still in the enjoyment of the feast." The nests are of large size and composed of sticks and branches and placed in very high trees, often more than a hundred feet from the ground. The eggs are similar to those of the Golden Eagle. As this species often commits extensive ravages among the lambs on the sheep ranges, it is killed by the stock-owners whenever and by whatever means possible.

The Hawk-Eagles. — Also members of this subfamily are the so-called Hawk-Eagles (*Eutolmaëtus*) of the Old World. They are smaller and rather more slender than the true Eagle, and have relatively longer and more slender tarsi, as well as longer tails, and most of them are partly or wholly white beneath, at least in some phase of the plumage. They have moderately long but strong and much hooked bills, long wings, and nearly square tails, while the toes are long and furnished with large, sharp, well-curved talons. Of the four species, perhaps the best known is Bonelli's Eagle (*E. fasciatus*), which ranges from the Mediterranean countries east to the Indian peninsula. The male is twenty-seven and the female twenty-nine inches long, and when mature they have the upper parts dark umber-brown with the bases of the feathers white, while the sides of the head and upper tail-coverts are whitish and the lower parts white with black shaft stripes, the young being paler above and more or less rufous or buff below. This fine Eagle is quite abundant in British India and is often seen sailing at a considerable height or sitting on a high tree or rock. Unlike some of those first described, Bonelli's Eagle captures its own prey and is never known to feed on carrion. It subsists on mammals and birds and is described as being very destructive to domestic fowls and especially to Pigeons, rarely failing to secure one from every flock it strikes at. In India it is known as the "Mohrangi," or Peacock-killer, on account of its propensity for killing the Peafowl. The nest by preference is placed on a ledge of a precipitous cliff, but occasionally in trees, and is usually a very bulky affair, sometimes including as much as half a ton of

material. It is generally rather flat on top and on a bed of green leaves rest the one to three large eggs. On the plains of India the nesting season, according to Hume, is December and January, while in the Himalayas it is sometimes as late as April or May. Very similar to this and sometimes confounded with it is the African Hawk-Eagle (*E. spilogaster*), which ranges throughout tropical Africa. It is slightly smaller, with considerably shorter wing, and differs in plumage in the absence of bands on the under side of the primaries, and in white instead of blackish under wing-coverts. Its flight is described as heavy, though when once it has risen to a certain height it soars powerfully. Its food is similar to that of its relative, consisting of small mammals, birds, and poultry. Much smaller is the Dwarf or Booted Hawk Eagle (*E. pennatus*), the male being only about nineteen inches long and the female about twenty-four. It is subject to considerable variation in the color of the plumage, especially of the under parts, there being a light and dark phase, but may be distinguished by the whitish patch on the shoulder. The Booted Eagle is widely distributed, ranging from southern Russia and the Mediterranean countries over Africa, and central Asia to the Indian peninsula and Ceylon. It frequents woods and cultivated fields, and is often found about towns and villages, and is said to commit serious depredations on the poultry yard and dove cote, but otherwise feeding on squirrels, rats, and other small mammals and birds. This bird breeds in southern Europe as well as in Africa and India, though mainly a winter visitor in the latter country. The nest is similar to that of its near relatives and the eggs, usually two, are greenish white, sparingly marked. The fourth species is the Little Eagle (*E. morphnoides*) of Australia, a form closely allied to the last.

Crested Eagles. — Passing over a number of small, relatively unimportant genera, we come to the large group of so-called Crested Eagles (*Spizaëtus*), although the crest is not quite always present. They are found in Central and South America and the central and southern parts of the Old World, being birds of moderate size with a short, much-curved bill, short, rounded wings, and long, nearly square tail. The tarsus is long, slender, and feathered throughout, while the toes are large, but not long, and unequal in size, the hind claw being largest. They are in general birds of the forest and are more frequently observed flying among the trees than above them, and they rarely soar. Of the sixteen or more species described we may mention especially the Indian Crested Eagle (*S. cirrhatus*), in which the male and female are respectively twenty-six and twenty-nine inches in length. They are umber-brown above and have the breast white with large spots and the abdomen and under tail-coverts brownish white. The crest is from four to six inches long, black, and except in very old birds tipped with white. They are often seen perched on trees watching for their prey of hares, Partridges, young Peafowl, and Jungle-fowl, on which they pounce. The nest, a large structure placed on a high tree, is lined with green leaves, on which the single egg is laid. Very similar to this species in coloration is the Changeable Crested Eagle (*S. limnaëtus*), but differing from it in having no crest or only a rudimentary one. Its habits are similar to those of the last.

The striking African Crested Eagle, while closely allied to the last group, has

been placed in a genus by itself (*Lophoaëtus*), and is a bird about twenty-five inches long, glossy brown, almost black above, being lightest on the cheeks and shoulders and darkest on the ends of the wings and tail, while the under parts are almost black, and the legs nearly pure white; it has a large, conspicuous black crest of numerous long feathers. The only species (*L. occipitalis*) ranges throughout the whole of Africa, but is perhaps most abundant in the eastern districts, frequenting mountainous wooded areas and the open plains as well, where it may be seen perched on some tree or bush watching for its prey, which consists largely of small mammals, birds, lizards, frogs, and snakes, and when hard pushed it will resort to carrion. The stomach of one killed in South Africa was found to contain a full-grown rat, eleven small ones, and a mouse. Its nesting habits are not well known, although it is said to build in trees and to lay two eggs.

The Harpy Eagles (Subfamily *Thrasëtinæ*).—Taking their name from the mythological winged monsters which were sent by the gods to carry off offenders, the Harpies are among the largest and most powerful birds of prey, and many are the stories current of their prowess. They are comprised in five genera and six species, being mostly natives of Central and South America, with one extending into Mexico and possibly to the southern border of the United States in Texas. The affinities and systematic position of the Harpies have been more or less questioned, some associating them directly with the Buzzards, with which they undoubtedly have a number of points in common, but it seems best to regard them as entitled to full subfamily rank. Aside from certain anatomical peculiarities they differ from the true Eagles in having the posterior side of the metatarsus covered with large transverse plates, thus agreeing with the Buzzards, from which, however, they are distinguished by the presence of a well-defined crest. They have strong bills of moderate length, rather short, rounded wings, and unusually long tails, the latter thought to be of especial assistance in guiding them in their rapid flight among the forest trees, where they often make their home and where they pursue their prey.

The **Harpy Eagle** (*Thrasaëtus harpyia*) is at once one of the most magnificent and powerful of the birds of prey known, having a length of some forty inches and a spread of wing of about seven feet, and its abundant power of flight and voracious nature make it a terror among the birds and mammals where it dwells. Its legs and feet are nearly twice as large and strong as those of any other bird of prey. The prevailing color of the upper parts, including the chest, is black, more or less mottled with gray, while the head and neck are gray, darker on the crest, and the under parts pure white, with the thighs narrowly barred with black, and the tail broadly barred with black and mottled with ashy. The young are ashy gray and black above, with the head, neck, and lower parts white. This species is found in tropical America, ranging south to Bolivia and Paraguay and north to Mexico, rarely extending so far as the mouth of the Rio Grande, thus giving it claim to be called a native of the United States. It frequents the dense forests, where, according to Dr. Oswald, it makes its way with almost incredible swiftness, and "can overtake the swiftest birds of the tropical woods, and in spite of its

size steers its way through the labyrinth of forest trees and hanging vines, and rarely fails to rise with a 'Pheasant,' a Woodcock, or a small mammal in its claws, after plunging like a meteor from the clouds into the leafy maze of the *tierra caliente*." The nesting site commonly chosen is a tall tree of the jungle, or a ledge among the more inaccessible cliffs of the foot-hills, where they build a large structure which is repaired and used from year to year. It is said that the Harpy lays four or five eggs, but never hatches more than two, the remaining eggs according to the native Indians being used to feed the first two Eaglets that hatch. This should perhaps be taken with some allowance, for as a matter of fact the nesting habits are none too well known.

Perhaps best placed here is the powerful **Philippine Monkey-eating Forest Eagle** (*Pithecophaga jefferyi*), which was first brought to scientific attention about ten years ago. Of large size, exceeding a length of three feet, it has relatively short wings, a very long tail, and naked tarsi and feet, the latter resembling those of the Harpy Eagle, although considerably weaker. The skull is enormous, being very much larger than that of the Harpy, while the bill is extremely narrow and of very great depth,—in fact, the depth of the bill is greater than that of any known bird of prey except perhaps Pallas's Sea Eagle, and the relative narrowness is unique among birds of this order, being only approached by certain Parrots. Mr. Ogilvie-Grant considers it to be most closely related to the Harpy, but Dr. Sharpe places it next the Serpent Eagles (*Spilornis*). It is a very rare bird, only five examples, so far as known, having thus far fallen into scientific hands. It inhabits the dense and all but impenetrable forests of several of the Philippine Islands, and feeds chiefly upon the green monkey (*Macacus*), although not infrequently it visits the villages and carries off domestic poultry. It is said to have a strange, wailing cry, but beyond this almost nothing is known of its habits.

The **Crowned Harpy** (*Harpyhaliaëtus coronatus*), which ranges over South America and north as far as Guatemala, is about thirty-three inches long, ashy brown above, with a long occipital crest of darker feathers, and paler ashy brown lower parts and blackish thighs. The tail, which is shorter than that of the last species, is black with a broad white median band and a white tip. This bird was found in limited numbers by Hudson in Argentina, where it was usually seen perched on the tall willows along the streams, or soaring in wide circles far up in the sky. The Crowned Harpy is said to prey chiefly on the skunk, as most birds captured bear unmistakable evidence of having been in close quarters with this animal; but as Hudson suggests, the Eagle may be driven by the pangs of hunger to attack a skunk, but whether they succeed in the attack is quite another matter.

The **Guiana Harpy** (*Morphnus guianensis*) of Amazonia, Guiana, and Panama is separated from the others principally by the fact that the tail is of extraordinary length, this being more than four times as long as the very long tarsus. This bird is about thirty-six inches long, the general color above being black, shaded with brown on the margins of the feathers, the head and neck becoming grayish, and most of the under parts white, as are the tips of the upper tail-coverts and upper wing-coverts. The tail is black, tipped with whitish brown

and crossed with three bars of ashy brown. This species is confined almost exclusively to the dense tropical forests, being rarely seen in the open country. There is an allied species (*M. tæniatus*) in Ecuador, and an allied genus with a single species (*Harpyopsis novæ-guineæ*) in southeastern New Guinea.

Old World Vultures (Subfamily *Vulturinæ*). —To all intents and purposes the Old World Vultures are similar in appearance and habits to their relatives in the New World, and all were at one time united in a single group, but as already pointed out, they are essentially different in structure, having imperforate nostrils and the hind toe on the same level as the front ones, as in typical members of the group. They are large birds, with strong feet, rather blunt claws, and featherless head and neck, and all feed to a greater or less extent on carrion. They are disposed in seven genera and about seventeen species, but as it will not be possible to fully describe them all, a few of the more striking and interesting forms may be selected and briefest mention made of a few others.

Black Vulture. —One of the most typical members of the group is the Common Cinereous, or Black Vulture (*Vultur monachus*), a bird distributed from southern Europe and northwestern Africa through central Asia to India and China. It is about forty-two inches in length and is dull sooty black in color, with brownish or chocolate reflections. The "ruff" at the base of the neck is composed of pointed, downy feathers, while the head and throat are covered with a short, velvety, black down. The bare skin above the neck is of a livid flesh-color. The nostrils are small and nearly circular. It is described as being a sluggish, repulsive bird, feeding almost exclusively on carrion and such refuse. "Repulsive and hideous-looking as are a group of Vultures assembled around a carcase of a large animal and gorging themselves to satiety upon its contents, their appearance is very different as they are seen wheeling in circles at a great height in the blue sky of a tropical noon; and no spectacle is more interesting than to watch the Vultures flocking up from all parts when some of their number have detected a prey, and dropped to earth to feast upon it."—"Royal Natural History," IV, 254. The Cinereous Vulture prefers wooded districts and constructs a bulky nest of sticks, usually in a tree, though not rarely on a rocky ledge. They deposit but a single large egg, which is white, richly marked and blotched with red.

The **Griffon Vultures**, of which the Common Griffon (*Gyps fulvus*) may be taken as the type, number some seven more or less well defined species. They are of about the same size as the Cinereous Vulture, but may be distinguished by the oval, transversely placed nostrils, and a tail of fourteen feathers. The various members of the genus range over eastern Europe, nearly the whole of Africa, and hence through Persia to India and the Malay Peninsula. They prefer the more open country and invariably nest on rocks, several often nesting near together. So far as known but a single, white, unspotted egg is laid.

The Eared Vultures. —The so-called Eared Vultures of the genus *Otogyps* take their name from certain naked, fleshy folds or lappets on the sides of the head. Two species are known, of which the African Eared Vulture (*O. auri-*

cularis) is the larger, being some forty-five inches in length. It is found occasionally in southern Europe, but principally in Egypt and tropical Africa, being brown in color, and has the inner surface of the thighs feathered, whereas the other species, known as the Pondicherry Vulture (*O. calvus*), has the inner surface of the thighs naked. The latter is a much smaller bird with the plumage black, and it is found in the Indian peninsula and the Indo-Chinese countries. They build nests of great size, which are often used from year to year, one described by Hume containing over 600 pounds of material. The nests are always placed in trees, especially the tall banyans.

Egyptian or White Vulture. — The last that we shall have space to consider is the Egyptian Vulture (*Neophron percnopterus*), or, as it is sometimes called, the White Vulture, White Crow, or "Pharaoh's Chicken." It attains a length of some twenty-five inches and is distinguished from all other members of the group by its elongated nostrils and long, slender, but not very strong, beak. The color of the plumage, with the exception of the black wing-feathers, is whitish throughout, whence of course its names. It is especially common throughout the countries surrounding the Mediterranean and thence extending through Africa and eastward to northwestern India. It is a typical scavenger Vulture, feeding on carrion, offal, and refuse of all kinds, and has earned for itself the name of being the most disgustingly loathsome member of the whole group, and yet with all it is regarded a valuable member of society and is carefully protected wherever it dwells. This protection has consequently given it confidence in the presence of human beings, and it frequents towns and cities, where it is said not to be an uncommon sight to see them "wrangling for some scraps of offal among the very feet of horses and camels of a market place." The nest, a bulky affair of sticks and lined with rags, is placed on rocks, buildings, or even on trees, and often in, or close to, towns and cities. The eggs, two or sometimes three or four in number, vary from greenish or reddish white to a dingy blood-red color, usually spotted or blotched with brown.

Fig. 79. — Egyptian Vulture, *Neophron percnopterus*.

Lammergeier. — As possibly showing a transition from the Vultures to the Eagles we may briefly mention the so-called Bearded Vulture or Lämmergeier (*Gypaëtus barbatus*), a magnificent bird of central Europe and the Mediterranean countries, whence it extends to central Asia, the Himalayas, and northern China. It differs markedly from the true Vultures in having the head feathered, but otherwise its structure and habits would seem to ally it more with them than with the Eagles. It would probably be entirely justifiable to create a sub-

family for the reception of the genus *Gypaëtus*, as was long ago suggested. It is a large bird, attaining a length of forty-two to forty-six inches, and a spread of wings of some nine or ten feet. The following description of the plumage

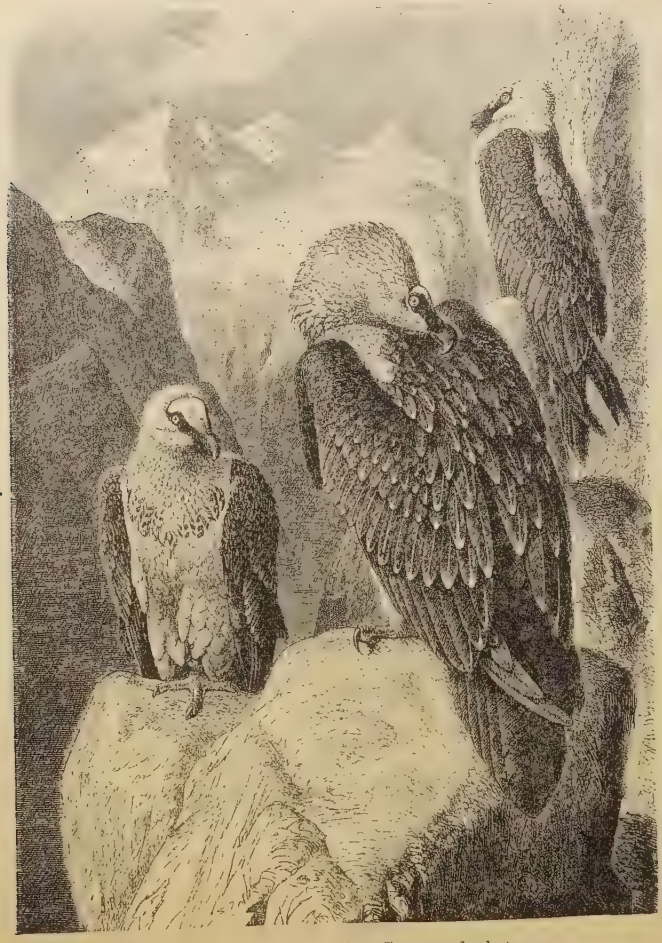


Fig. 80. — Lämmergeier, *Gypaëtus barbatus*.

is from Newton: "The top of the head is white, bounded by black, which, beginning in stiff bristly feathers turned forward over the base of the beak, proceeds on either side of the face in a well-defined band to the eye, when it bifurcates into two narrow stripes. A tuft of black, bristly feathers projects beard-like from the base of the mandible. The rest of the head, the neck, throat, and lower parts generally are clothed with lanceolate feathers of a pale

tawny color — sometimes so pale as to be nearly white beneath, while the scapulars, back, and wing-coverts generally are of a glossy grayish black, most of the feathers having a white shaft and a median tawny line. The quill feathers, both of wings and tail, are of a dark blackish gray." They breed early in the year, building a nest of large size which is composed of sticks and lined with softer material, placing it on a rocky ledge or a niche in the face of a cliff, usually in an inaccessible position, where they lay but a single egg, which is described as being pale brownish orange in color. There is considerable disagreement among observers regarding the usual food of the Lämmergeier, some claiming that the bulk of it consists of carrion, offal, etc., while others assert that they are able to capture their own prey. Doubtless the truth lies between, for while they undoubtedly eat carrion it is equally true that they not infrequently kill the young of various animals. Two other species of *Gypaëtus* are known from the mountains of Africa.

The Harrier, Serpent, and Bateleur Eagles (Subfamily *Circaëtinæ*). — The present group of exclusively Old World birds exhibits distinct features which ally it to the true Buzzards, which will be considered shortly. They are embraced in several genera and perhaps twenty-five species, but the following are all that we shall have space to mention.

The **Harrier-Eagles** (*Circaëtus*), so called from their habit of beating and hovering much after the manner of the Harriers, are birds of moderate size, with large heads, medium-sized but much hooked bills, and oval nostrils which are overhung by bristles from the lores. The tail and wings are long and the tarsi naked, except above, and covered all around with small, rounded, overlapping scales, while the toes and claws are short, the latter not much curved. Of the six species, four are confined to various parts of Africa, while the others are of wide distribution, the Common Harrier, or Short-toed Eagle (*C. gallicus*), ranging from southern Europe and the Mediterranean countries to central Asia. In this species the female is about twenty-eight and the male twenty-six inches long, the general coloration being brown above, with the head becoming ashy, the wings blackish, and the under parts white, the throat streaked with brown and the flanks with broad dark bars. The tail is brown, white-tipped, and crossed with three or four dark bands. This species frequents the open country and cultivated ground, where it is often seen perched on trees or beating over the ground and bushes for its prey, which consists of snakes, lizards, frogs, crabs, rats, and large insects. The nest is usually placed in trees, though occasionally on a shelf in the face of high clay cliffs of rivers. When suitable trees are available the nest is placed in the top of a very high one; but where only low trees are to be had it places the nest perforce only from fifteen to twenty feet from the ground. The nest is rather loosely constructed of sticks and lined with grass or green leaves, and so far as known but a single egg is laid, this being bluish white and unspotted. The Black-breasted Harrier-Eagle (*C. cinereus*) is a quite generally distributed but always rather rare bird of tropical Africa, being blackish brown tinged with gray above, the breast brownish black, and the lower parts white, while the tail is gray, crossed by broad black

bands. It is found along timber-covered ravines, and feeds largely upon snakes and lizards, the stomach of one killed in South Africa by Mr. Thomas Ayres containing the remains of a very poisonous snake that could not have been less than seven or eight feet in length.

Serpent Eagles. — More numerous in species, and also natives of the Oriental region, are the Serpent Eagles (*Spilornis*), which differ from those last considered "by having a broad nuchal crest covering the whole nape, and by the peculiar coloration, being brown above and below in adults, all but one or two with rounded white spots or ocelli on the lower parts." Their wings are short and rounded, the 4th or 5th quill being longest, while the tarsus, toes, and claws are the same as in the Harrier-Eagles.

The Serpent Eagles, a name, by the way, which is sometimes applied to the last group, but which is best restricted to the present, take their common name from the character of their food, which consists largely of snakes and other reptiles. They are more sedentary and arboreal in their habits than their relatives, and are less often seen on the wing, preferring to watch from some vantage point for their prey. Of the fifteen species recognized, the Indian Serpent Eagle (*S. cheela*), of the Himalayas and the Indian peninsula, is the largest and perhaps best known. In this the male is about twenty-eight inches and the female thirty inches long. The upper parts are dark brown with a rich purple or ruddy gloss, the crown and the crest black, the basal half of the feathers being white, while the lower parts are brown of various shades, more or less spotted and barred. The smaller wing-coverts are blackish with small white spots; the tail is also blackish, mottled with whitish and crossed by brown bars. This bird, according to Blanford, is "usually found on trees near water, especially the trees along irrigation channels and canals in upper India, and along stream-beds in the lower Himalayas and in the central provinces and southern India." It may be known by the strongly marked bars on the wings and tail and above all by its loud, plaintive cry. The nest is built in trees, and on the shallow lining of green leaves one, or at most two, eggs are laid, these being more or less streaked and spotted with brownish red and purple. This species, besides feeding on snakes, frogs, and lizards, sometimes captures small mammals, birds, and large insects. Intimately related to this are three or four other species which have practically the same type of coloration but differ in size, and there is a single species that has the abdomen barred instead of spotted, thus departing from the typical color pattern of the genus. Quite a number of species are confined to single, often small, islands.

Bateleur Eagle. — Markedly different in general appearance and coloration, and perhaps not correctly referred to this subfamily, is the striking and handsome Bateleur Eagle (*Helotarsus ecaudatus*) of Africa below the Sahara. It is a small eagle, the male being about twenty-one and the female twenty-five inches in length, and is remarkable among other things for the relatively long and pointed wings and the extreme shortness of the tail, this being shorter by more than the length of the tarsus than the wings, which, combined with the large, very much crested head, give it a peculiar "dumpy" appearance. The

head and neck all around, as well as the under parts, are glossy black, while the hind neck and back are rich maroon. The scapulars are black, the wing-coverts bronzy brown, the primaries blackish, and the secondaries ashy gray with black tips. The tail and its under coverts are deep maroon, while the under wing-coverts and secondaries beneath are white. To complete the picture the cere, orbits, and feet are coral-red, the bill black, and the iris brown. The Bateleur Eagle is a not uncommon species in many parts of Africa, Andersson, for instance, regarding it as the most common Eagle in Damara and Great Namaqua Lands. There he found it usually in the plains, although in other parts of its range it frequents open mountain districts. It is often seen soaring, at which it is described as a past master, almost equaling the Vultures, as it sails about without flapping a wing, but, says Mr. Abel Chapman, " when they stoop they come out of the sky like a lightning flash." There seems to be some disagreement as regards their food, some asserting that they kill their own prey and never, in a wild state, touch carrion, while others insist that it is fond of the latter food. That it feeds on snakes of all kinds is certain, and that it often captures the young or sick of various animals, birds, lizards, etc., is equally attested. The nest is always placed in trees, usually those of a very sturdy nature, and is composed of a large mass of sticks bound firmly together, but is without any kind of lining. The eggs are white and are said to be two to four in number. There is a form of this Eagle in which the back is cream-colored, but otherwise not different from the typical bird, that is regarded by some as entitled to specific rank, but it is possibly only a very old or fully adult stage of the Bateleur.

The Harriers (Subfamily *Circinæ*). — When one becomes familiar with the habits of the birds of this group, watching them as they course backward and forward over marsh and meadow in quest of their prey, it is easy to appreciate the appropriateness of their common name of Harrier. They spend most of the time on the wing in a steady gliding flight, seldom flapping, and usually but a few feet above the surface. Although there are several genera, we shall have space for only the typical genus (*Circus*), which embraces some twenty species, and is of almost cosmopolitan distribution. They are birds of moderate size, none apparently exceeding twenty-four inches in length, and of slender form, with relatively long wings and tail, and rather weak legs and slender feet. The head is small and there is a ruff of small, soft feathers, more conspicuous in some species than in others, surrounding the face, as in the Owls. The bill is small and rather weak, while the claws are much curved and very sharp. They are especially remarkable for the great diversity in coloration in the plumage of the male and female, an unusual condition among birds of prey. Only a single species — the **Marsh Hawk** (*C. hudsonius*) — is found in North America. The adult male is light bluish gray or ashy above, with the upper tail-coverts white, the tail silvery gray barred with blackish, while the upper breast is pearl gray, and the lower breast and abdomen white, spotted with rufous. The mature female is fuscous above, with the head and neck streaked, and the wing-coverts spotted or margined with rufous; the upper tail-coverts are white

and the tail barred with ashy and black or buff and black, while the lower parts are buff, widely streaked on the breast and narrowly streaked on the abdomen with fuscous or light umber. The young are similar to the female, but are darker above and more tawny below. The total length of this species is from nineteen and one half to about twenty-four inches, and it is easily recognized on the wing by the conspicuous white patch above the base of the long tail.

The Marsh Hawk is undoubtedly one of the best known of our birds of prey, since its breeding range covers practically the entire continent. "It is a familiar sight," says Beddire, "to see a pair, and often several, of these birds skimming close to the ground, now along the borders of a meadow, or the shrubbery found close to the banks of small streams, and the tule-covered borders of fresh or salt marshes, actively engaged in search of their prey. Its flight is singularly easy and graceful. One moment it may be seen sailing or drifting along before a strong breeze without an apparent movement of its wings, in the next it may raise or lower itself or turn completely over, in undulating motions; dropping suddenly in the grass, or staying suspended in the air over some point which might be suited to the location of its intended quarry." Its food consists largely of meadow mice, ground squirrels, frogs, grasshoppers, locusts, and large crickets, and to some extent of lizards, snakes, occasional ground-haunting birds, and young poultry, and when hard pressed it is said to feed on offal and carrion. It has been known to come at the sound of a gun and carry off the wounded or dead bird, but on the whole it is deserving of the most careful protection for its agency in the destruction of mice, ground squirrels, and injurious insects. Dr. A. K. Fisher, who examined the contents of 124 stomachs, reports that 7 contained poultry or game birds; 34, other birds; 57, mice; 22, other mammals; 7, reptiles; 2, frogs; 14, insects, while 8 were empty. As might be expected in a species enjoying such a wide range, the nesting season varies in the different parts of the country, beginning as early as April in Texas, and not until June in the fur countries. The nest is always made on the ground or close to it, and usually not far from water, as a marsh or prairie grown up with tall grass or bushes, being placed in a thick bunch of grass, on the top of a tussock, or occasionally on a low bush. It is usually a slight affair of grasses and a few sticks, and lined with similar material and sometimes a few feathers from the sitting bird. Both sexes assist in building the nest, and when it is completed the complement of eggs is added, these being from three or four to six, and sometimes as many as eight in number, dull white or pale bluish white and mostly unspotted.

South American Harriers.—Two species in South America complete the representation of this genus in the New World, these being the Cinereous Harrier (*C. cinereus*) of the southern portion of the continent, and the Long-winged Harrier (*C. maculosus*) of South America in general. In the first the male is bluish gray above, with darker mottlings, the primaries blackish, and the tail gray with four black bands, while the throat and neck are, like the back and the abdomen, thickly barred with white and rufous. The female is dark brown above with lighter spots. This species is exceedingly abundant

on the pampas, where its flight is low and always rather rapid, "while if its quarry should double it loses no ground, for it turns something in the manner of a Tumbler Pigeon, going rapidly head over heels in the most eccentric and amusing fashion." It appears to feed largely on small birds, driving them up from the tall grass and then striking them down with its claws. Its nesting habits are similar to those of our Marsh Hawk, but the eggs are described as white, blotched with dark red. The Long-winged Harrier is black above and on the chest and throat, while the frontal band, stripes over the eyes, upper tail-coverts, and abdomen are white.

Hen Harrier. — In the Old World our Marsh Hawk is replaced by the handsome Hen Harrier (*C. cyaneus*), which ranges in summer over northern Europe and northern Asia, and in winter is found throughout the Indian peninsula and China. It is smaller than our species, the male being about twenty-one and the female twenty-two inches long, the former being bluish gray above and white below, and the latter reddish brown with the under parts pale reddish yellow, streaked and spotted with deep orange-brown. These differences between the sexes are so great that they were long regarded as representing distinct species, and it was not until a brood had been reared from the nest that they were proved to be the same. The Hen Harrier was formerly an abundant bird in the British Islands, but it has been subjected to such incessant persecution by gamekeepers and others that it is almost exterminated, being practically confined as a breeding bird to the wildest moors of Wales and the Scotch Highlands. In other parts of Europe it is more abundant, where, like its American relative, it places its nest on the ground in marshes. The eggs, four to six in number, are of a pale bluish white color, in some cases spotted with pale brown.

The **Marsh Harrier,** or **Moor Buzzard** (*C. æruginosus*), is another handsome species of temperate Europe and Siberia, whence it migrates in winter to Africa, India, and China. It was also once abundant throughout the British Islands, but owing to constant molestation it has now become extinct as a British bird. The male has the upper parts brown, the head creamy white, and the lower parts buff, streaked with brown and chestnut, while a part of the wing and tail is pearl-gray. The female is very similar, being a little darker. It is most frequently observed about fens and marshes, although sometimes it may be seen hunting over dry grass plains. Its food and nesting habits are similar to those of the last-mentioned species, from which, however, it differs in being much larger. Hardly to be distinguished from the Hen Harrier, except in its smaller size and greater comparative length of wing, is Montagu's Harrier (*C. pygargus*), a bird enjoying nearly the same range as the Marsh Harrier, and having practically the same life habits. Other species are the Pied Harrier (*C. melanoleucus*) of eastern Siberia and Mongolia, Gould's Harrier (*C. gouldi*) of Australia and New Zealand, the Black Harrier (*C. maurus*) of South Africa, and the South African Marsh Harrier (*C. ranivorus*).

The Urubitingas (Subfamily *Urubitinginæ*). — Inasmuch as the Urubitingas appear to differ sufficiently to warrant their being made the type of a subfamily, they may claim a passing notice. Three species are known, all natives

of the New World and mainly ranging south of the United States. The adult birds, which vary in length from twenty-two to about twenty-five inches, are of a uniform plumbeous black, with the upper tail-coverts, several bands across the tail, and the tip of the tail pure white. The Mexican Black Hawk (*Urubitinga anthracina*), the smallest of the three species, is found throughout tropical America in general, coming north into southern Arizona and Texas. It is a migratory species, returning to its summer home the first part of April and retiring in October, frequenting while with us the dense trees and undergrowth along streams, among which it disappears so quickly as to afford but a fleeting glance. In most cases they appear to be shy birds, though Major Bendire found them unusually tame near Tucson, Arizona, allowing him to approach within thirty feet. They have a very shrill, often-repeated cry, that is an almost exact counterfeit of that of the spring piping of the Long-billed Curlew. The nest, which is evidently occupied for a long series of years, is a bulky affair sometimes measuring four feet in depth and two feet in width, and is lined with green leaves. The nesting habits are not very well known, but it appears that one or two eggs constitute the set, these being white, marked over the entire surface with small irregular blotches of reddish brown.

The Brazilian Urubitinga (*U. urubitinga*) is found from tropical America to the Argentine Republic, and the Mexican Urubitinga (*U. u. ridgwayi*) from Guatemala north to Vera Cruz and Mazatlan.

The Buzzards, or Buzzard-Hawks (Subfamily *Buteoninæ*). — The word Buzzard is derived, through the French *busard*, from the Latin *buteo*, and according to Newton should perhaps properly be restricted to the common Buzzard (*Buteo buteo*) of western Europe, but as a matter of fact it is applied, at least as a book name, to the entire group under consideration. In North America, however, where the Black and Turkey Vultures are almost always denominated "Buzzards," this name is rarely if ever applied to the members of the present subfamily, these being called "Hawks," with some distinguishing prefix, as "Red-tailed," "Swainson's," "Red-shouldered," etc. The Buzzards, when the name is applied in the broad sense as standing for this whole group, embrace several genera and a large number of species, of medium-sized or some of them large birds, of heavy, compact build and rather sluggish habits as compared with many of the other diurnal birds of prey. They bear the reputation of being more or less cowardly and pusillanimous in disposition. More than a century ago Gilbert White wrote: "The Buzzard is a dastardly bird, and beaten not only by the Raven, but even by the Carrion Crow." This may apply to the species of which it was said, but it is not wholly applicable to the New World representatives, for, while they may lack the snap and vim evinced by the Falcons, they are by no means without courage and spirit.

The genus *Buteo*, which may be recognized as typical of the subfamily, is a large group of some thirty-three forms, no less than twenty-two of which are natives of the New World. The remainder are widely distributed in the Old World, except in the Indian and Malay provinces, and Australasia and Oceanica, where they are unknown. They have the heavy, robust build characteristic

of the group, with the bill of small or moderate size, the culmen, which is curved from the cere, with the commissure nearly straight and exhibiting no evidence of a tooth. The wings are always ample and long, the third to fifth quills longest, with the first three or four emarginated on the inner webs, while the tail is of moderate length and rounded at the end. The tarsus is rather long, naked or nearly so, and covered with scales, while the toes are short but provided with strong claws.

The Buzzards have usually been placed next the Eagles, with which they have many points in common, but they differ, among other things, in assuming, it is said, the adult plumage after the first moult, whereas it takes several years for the Eagles to attain full plumage. But despite this lack of a series of immature plumages in the Buteos, there is abundant variation in their coloration, since distinctly light, rufous, and melanistic (black) forms are found in several species, in some instances these differences being so marked as to have resulted in their being regarded as distinct species. In general the Buzzards feed on mice and other small mammals, snakes, frogs, lizards, large insects, and an occasional bird, usually an injured or sickly one, and some of the American species have the more or less deserved reputation of helping themselves in the poultry yard.

Red-tailed Hawk. — One of the best known North American Buzzards is the Red-tailed Hawk, which, under several well-marked forms, ranges throughout the entire continent. The typical form and the Red-tail *par excellence* (*Buteo borealis*) is found in the eastern United States and west to the border of the Great Plains. It is from nineteen to about twenty-five inches in length, blackish brown above, variegated with gray, fulvous, and whitish, and white with more or less of buffy below, with the abdomen streaked with brownish, while the tail is deep rusty rufous, with usually a subterminal band of black. In the immature bird the tail is gray without any shade of red, and is crossed by six to ten dark bands. Although one of our larger birds of prey, it is not very active in its movements, but may frequently be seen sitting, for hours at a time, on a dead limb of a tall tree, watching for its quarry. It frequents moderately timbered districts, especially swampy woods along water courses, although it is not infrequently found in upland woods and in mountain regions. It is usually a very shy and wary bird, for continued and persistent persecution has made it suspicious of man, yet it is a bird about which there is not a little misunderstanding. It occasionally makes a meal off young poultry, or an overconfident game bird, and consequently it is killed whenever opportunity presents under the supposition that it is the chief offender in these depredations. As a matter of fact its food consists principally of mice and other small rodents, as well as frogs, reptiles, and insects, and only rarely of poultry or game birds. Of 562 stomachs of this species examined by Dr. Fisher, only 54 contained the remains of poultry or game birds, while 409 contained mice or other mammals, principally the former, and 37 had been feeding on batrachians and reptiles, and 47 on insects. The destructive propensity of meadow mice, shrews, and ground squirrels is enormous, and unless in some way kept in check would result in

Fig. 81. — Red-tailed Hawk, *Buteo borealis*.

vast damage to the agriculturist. The Red-tail does just this thing, and consequently is deserving of protection rather than persecution at the hands of the farmer.

During the mating season these birds are perhaps most prominently in evi-

dence, since they are often to be observed circling about and chasing each other high in air, and uttering their shrill, often repeated, and far-reaching *skee' e e e*. The nest is placed in a tree, usually fifty or sixty feet from the ground, and is a bulky structure of large sticks, the nesting cavity being usually shallow, and lined with bark, grasses, weed-stalks, etc., or sometimes unlined. Ordinarily they make but little demonstration when the nest or young are disturbed, although sometimes they defend their home by darting and screaming at the intruder. The eggs are usually two or three in number, with a dull or creamy white ground color, about one-fifth being unspotted, while the remainder are more or less spotted and blotched with various shades of brown.

Other Forms of Red-tail. — The following geographical races are recognized: the Western Red-tailed Hawk (*B. b. calurus*), which inhabits the country west of the Rocky Mountains as well as portions of Mexico; Krider's Red-tail (*B. b. kriderii*), found on the Great Plains from Minnesota to Texas; Harlan's Red-tail (*B. b. harlani*) of the lower Mississippi Valley and the Gulf States; the Socorro Red-tail (*B. b. socorroensis*), found only on Socorro Island, off western Mexico; and the Costa Rica Red-tail (*B. b. costaricensis*) of Costa Rica and Panama.

Red-shouldered Hawk. — Another well-known species is the Red-shouldered Hawk (*B. lineatus*), a slightly smaller bird than the last and with about the same range as the typical form. It is reddish brown above, the center of the feathers being darker than the edge, while the head, neck, and lower parts, but especially the shoulders, are more or less rusty or cinnamon, barred with whitish. The tail is black and crossed by about six white bands. It is a somewhat less shy bird than the Red-tail, and frequents lowlands bordering streams and marshes, or, during the nesting season, upland woods. Although its food is largely the same as that of the Red-tail, it is obliged to share with that species the undeserved reputation of being a poultry yard marauder, yet out of 220 stomachs examined from birds killed at all seasons and in many parts of its range, only 3 contained poultry, and 194 mice and insects, a sufficient proof of its usefulness. The nest is not unlike that made by its relative, being composed of sticks of various sizes, and lined with bark of the grapevine and other fibers, or occasionally with a few green leaves. The eggs are usually three or four in number, but sets of five and even six have been known; they are dull white or bluish white, variously spotted and blotched with different shades of brown. There are two geographical races of this species, a more rufous or rusty-breasted form on the Pacific coast and a smaller race in Florida.

Other American Species. — Space will permit no more than a bare mention of other American species. The Zone-tailed Hawk (*B. abbreviatus*), a bird of South and Central America, and northward to the southern border of the United States, is uniform black or blackish brown, the feathers with pure white bases, and has the black tail crossed by three broad zones of white. Swainson's Hawk (*B. swainsoni*), of western North America, is grayish brown above and buffy white below, and there is a distinct black phase in both sexes; the Little Black Hawk, so called, which may be known by the black or dark

sooty brown lower parts, is now regarded as the black phase of the Short-tailed Hawk (*B. brachyurus*), which has the lower parts white. It is a resident of tropical America in general, but comes north occasionally to Florida, where it breeds.

The **European Buzzard** (*B. buteo*) of western Europe is said to have been occasionally, though of course accidentally, found in the United States. It is from twenty to twenty-two inches in length, and is usually dark brown, mottled with brown of a darker shade, the tail being marked with about twelve narrow bands of dusky, though it varies greatly in coloration. It is described as a bird of quiet, sedentary disposition, feeding, like its American cousins, on small mammals, reptiles, birds, and insects. It was once a common bird in the British Islands, but has been nearly exterminated except in the wildest parts of Scotland and Wales. Its nest is placed on a rocky ledge or in trees, and sometimes it makes use of an old nest of some other species. The eggs are usually three in number, and are white, variously spotted and blotched with reddish brown.

Rough-legged Buzzards. — Closely allied to the true Buzzards are the Rough-legged Buzzards (*Archibuteo*), which differ in having weaker bills and feet and with the tarsus densely feathered in front to the base of the toes. They are as large as, or slightly larger than, the largest Buteos, and although numbering only four species, are widely spread over both the Old and New Worlds. The American Rough-legged Hawk (*A. lagopus sancti-johannis*) is one of the largest "as well as one of the most striking of American Hawks." It is about twenty-four inches long, irregularly varied above with white, grayish, and dusky, and whitish below, spotted, chiefly on the breast, with dusky, but sometimes nearly uniform black. It is, says Fisher, "one of the most nocturnal of our Hawks, and may be seen in the fading twilight watching from some low perch, or beating, with measured, noiseless flight, over its hunting ground. It follows two very different methods in securing its food, one by sitting on some stub or low tree and watching the ground for the appearance of its prey, as the Red-tail does; the other by beating back and forth just above the tops of the grass or bushes, and dropping upon its victim, after the manner of the Marsh Hawk. Its food consists principally, if not almost exclusively, of the smaller rodents, and most prominent among these are the arvicoline mice and lemmings." It is found throughout the whole of North America, but breeds mainly to the north of the United States, where Richardson speaks of it as hunting for its prey "by the subdued daylight which illuminates even the midnight hours in the high parallels." Its return from the north is forced rather by the advancing snow than by the cold, which it appears well able to withstand, and in spring it begins the return

FIG. 82. — European Buzzard, *Buteo buteo.*

journey in February and early March. The nest is placed in trees or on ledges, and is made of small sticks and twigs, and lined with fine grass and feathers. From three to five eggs constitute a set, these being greenish white, which fades to a dull white, and very variously marked. In the western United States this is replaced by the Ferruginous Rough-leg or Squirrel Hawk (*A. ferrugineus*), which is much larger and has a larger and stronger bill, and is much more rusty in coloration, with the under parts mostly pure white. This Hawk is preëminently a bird of the prairie, and is styled by Dr. Coues "the handsomest of the North American *Falconidæ*." It nests usually in trees, or where these are not available, on rocky ledges, building a rather bulky nest which is lined with weeds or grass. The ribs and smaller bones of the buffalo, where these existed on the plains, were sometimes used for the main part of the nest. The eggs — three or four in number — are similar to those of the last species.

The remaining species are the European Rough-leg (*A. lagopus*) of the western portions of the Eastern Hemisphere, and the Himalayan Rough-leg (*A. strophiatus*) of Nepal and Tibet.

Sparrow-Hawks and Goshawks (Subfamily *Accipitrinæ*).—The last of the subfamilies into which the diurnal birds of prey are here divided forms a large group of several genera and numerous species, which enjoy a practically world-wide distribution. They are in general very active birds, of small or moderate size, but endowed with indomitable courage and "dash." They have a slender, graceful form, with the head comparatively small and the bill weak, but provided with a prominent "festoon," while the wings are rather short and rounded, the tail long and usually rounded, or occasionally even, or emarginated. The legs are very long, and the feet slender, with the middle toe much lengthened, its first joint being about equal to the whole length of the inner toe. They are especially remarkable in having the tibia and tarsus of nearly equal length, the latter with the upper third or half feathered, while the bare space is connected with usually very distinct and continuous transverse scutellæ.

The **Sparrow-Hawks** (*Accipiter*), although not the birds so called in America, include some forty-two nominal species, and are generally of small size, differing mainly from the Goshawks (*Astur*), with which they are sometimes united, by their more slender form, and the much greater length and slenderness of the tarsi and toes. They are distributed over the four quarters of the globe, excepting Oceanica west of Australia and New Guinea, being, however, most abundant in tropical regions. They are found chiefly in forest or well-wooded tracts, and are more arboreal in their habits than the Falcons, hunting in woods or on the skirts of woods or along hedgerows, and usually seize their quarry by a quick pounce. Of the two species found in North America, the **Sharp-shinned Hawk** (*A. velox*) is perhaps the best known, although both are common. It is from ten to fourteen inches long, uniform bluish gray above, becoming darker on the top of the head, while the lower parts are white, with the breast and sides barred with pinkish brown or rusty. The tail is lighter in color than the back and crossed by four dusky bands. The immature birds have the upper parts dusky and more or less spotted with lighter, while the lower parts are whitish, streaked with brownish.

This active and daring little Hawk is found throughout the whole of North America, breeding in nearly every state of the Union and north as far as the Arctic Circle, and in winter is found from about parallel 40° N. southward as far as Guatemala. It is one of the most destructive and pernicious of all our birds of prey, since it feeds almost entirely on wild birds and young poultry, only occasionally adding to its bill of fare a few insects, mice, or reptiles. Of 159 stomachs examined by Dr. Fisher, 6 contained poultry or game birds; 99, other birds; 11, mice and insects; while 52 were empty. A very large percentage of the destruction of poultry is to be charged to this bird and its immediate relatives, for when they discover a locality whence small chickens are to be easily obtained, they usually continue the depredations "until the supply gives out, or they themselves meet a tragic death." It is exceedingly swift on the wing and comes and goes with such suddenness, when it visits the farmyard, that it is almost impossible to shoot it. While it lives perhaps mainly on small birds, it does not hesitate to attack species as large as or larger than itself, such as Wild Pigeons, Quail, Mourning Doves, Purple Grackles, etc. "Its flight when in pursuit of its prey," says Bendire, "is unerring and swift. No matter which way the selected victim may turn and double, his untiring pursuer is equally prompt, and only rarely will it miss capturing its quarry." The Sharp-shinned Hawk builds a rather bulky nest in a tree, often an evergreen, or rarely may make use of a hollow in a tree. The nest when outside is made of sticks of various sizes and is lined with small twigs or strips of bark. The complement of eggs is usually four or five, these being profusely spotted and blotched with various shades of brown. The female alone appears to perform the duties of incubation.

The **Cooper's Hawk** (*A. cooperi*) resembles the Sharp-shinned Hawk except in size, being from fourteen to twenty inches long, and by the fact that the end of the tail is rounded rather than straight or slightly notched. It does not range quite so far north, its breeding range being, with the exception of Alaska, nearly coextensive with the United States, where, however, it is widely distributed. It is even more destructive to birds and poultry than the last, possibly doing more harm than all other Hawks combined. It does not appear to be fond of small rodents, insects, or reptiles, and apparently only takes them when other food fails. Dr. Fisher found that of 133 whose stomachs were examined, 86 had been feeding on poultry, game birds, or other birds, and only 17 on mammals, frogs, lizards, and insects. In the remainder of those examined the stomach was empty. Bendire gives the following account of the habits of this species: "The flight of Cooper's Hawk is both easy and graceful, and ordinarily not especially swift. He may often be seen skimming along close to the ground, in rather a desultory manner, usually skirting the edges of open woods or clearings; but once in sight and active pursuit of its selected prey, it darts in and out through the densest thickets with amazing swiftness, where it would seem impossible for it to follow successfully. It manages, however, with the assistance of its long tail, which helps it very materially, to turn suddenly and double with remarkable ease, even in dense undergrowth, arresting its flight instantly, and darting off, perhaps at a right angle, the next second to capture its selected victim." Ordi-

narily when the nesting season arrives they select as a nesting site the abandoned nest of a Crow, one of the larger Hawks' nests, or a squirrel's nest, or when all these sources fail they may build a home of their own. They do not seem to have especial preference for any variety of tree, nor do they place the nest at any great height from the ground, for in the West where there is a scarcity of suitable timber the nest may be no more than ten feet up. The number of eggs ranges from two to six, four or five being more common.

The **European Sparrow-Hawk** (*A. nisus*), which belongs to the same group as those just described, was once a common bird throughout the British Islands, but on account of its depredations on the game preserves has been greatly depleted in numbers. It is widely distributed over Europe, northern Asia, and the Indian peninsula, and is abundant in India, where, as in other parts of its range, it is tamed and taught to take Partridges, Sand Grouse, and other similar birds. Another Indian species, known as the Besra Sparrow-Hawk (*A. virgatus*), has the breast and flanks so suffused with rusty as to nearly or quite conceal the bars. It is also used in hawking, and is regarded by the native falconers as superior in speed, courage, and endurance to the last-mentioned species.

The **Goshawks** (*Astur*) are very numerous in species, no less than sixty-three having been described, from practically the entire world, North America laying claim to three forms, the best known being the American Goshawk (*A. atricapillus*), which ranges over the northern and eastern portions of the continent and comes south in winter to the Middle States and the southern Rocky Mountain region. The male is about twenty-two and the female about twenty-four inches in length, in adult plumage being clear bluish gray or plumbeous, with blackish shaft-streaks above, the top of the head black with a white line over and behind the eye, and white below, the breast, belly, sides, and flanks being marked with irregular, wavy bars of slate-grayish, while the tail is crossed by about four dusky bands; the young are dusky grayish brown above, the feathers margined with buff, and whitish or pale buff streaked or spotted with blackish below. Trim, alert, and vigorous, the Goshawk is "the boldest and by far the most destructive of the North American Raptores, infinitely more injurious to our game birds, and the poultry yard as well, than any other species. Notwithstanding its comparatively short wings, its flight is powerful and swift; it is strong and active in body, shy and keen-sighted, savage and bloodthirsty in disposition, a veritable terror to all smaller birds, and more than a match for others considerably larger than itself. It loves to destroy life for the sake of killing." — BENDIRE. Fortunately it breeds mainly to the north, coming south only in winter, else it would be a terrible scourge to the poultry raiser. In the Yukon River region it feeds principally on Ptarmigan,

FIG. 83. — European Sparrow-Hawk, *Accipiter nisus*.

lemmings, and Arctic hares, and in Maine, Mr. Manly Hardy reports having seen one destroy five Ruffed Grouse in a morning, "tearing them to pieces and leaving them." The Goshawk nests in trees, constructing a bulky Crow-like nest, usually well up from the ground and in the thickest part of the forest; the eggs, which are bluish white and unspotted, number from two to five. The Western Goshawk (*A. a. striatulus*) occurs in western North America, from Sitka, Alaska, south to California and east to Idaho; it is dark plumbeous inclining to sooty blackish above and more heavily barred below. The only other North American species is the Mexican Goshawk (*A. plagiata*), which ranges over middle America to the southern border of the United States. It is smaller than the American species, being only about seventeen inches long, and is slaty gray above, and barred slaty gray and white below.

CHAPTER XXI

THE FOWL-LIKE BIRDS

(Order *Galliformes*)

THE *Galliformes*, or Fowl-like birds, constitute a large, practically cosmopolitan group of fairly well-marked birds, having the palate schizognathous instead of dromæognathous, the head of the quadrate bone double instead of single, the basal ends of the coracoids united and crossed instead of separated, and the bill vaulted and more or less decurved. They have large functional cæca, and a large crop, while the oil-gland is generally tufted, though it is nude in the Megapodes and absent altogether in certain Pheasants, such as *Argusianus*.

The Order *Galliformes* is divided into four suborders: the *Mesœnatides* with the single family *Mesœnatidæ* for the anamolous Madagascar Mesite; the *Turnices*, which embraces the families *Turnicidæ*, or Hemipodes, and the *Pediono-midæ*, or Collared Hemipodes; the *Galli*, which includes three families, the *Megapodidæ*, or Megapodes, the *Cracidæ*, or Curassows, and Guans, and the *Phasianidæ*, or Turkeys, Partridges, Quails, Pheasants, etc.; and, finally, the *Opisthocomi*, which includes only the South American Hoactzin, though the last is usually, and perhaps with good reason, separated as a distinct order.

THE MADAGASCAR MESITE

(Suborder *Mesœnatides*, Family *Mesœnatidæ*)

A very peculiar bird indeed is this so-called Mesite (*Mesœnas variegata*) of Madagascar, and quite in accord with many of the other anomalous life forms that at one time, or still, inhabit that far-away island. It is a small, quite Rail-like bird about ten and a half inches long, with a slender Grebe-like bill about the length of the head, and very strong legs and feet, with four toes, the posterior one of which is on the same level as the others; all the toes are provided with strong, rather sharp claws. The nostrils are very peculiar in that they are long, linear, concave, upturned slits, which extend for more than half the length of the bill, and are covered above by a membranous valve-like lid. The wings are short and rounded, with ten primaries, which are slightly exceeded in length by the inner secondaries, while the tail is rather long and broad, and composed of sixteen feathers. Another remarkable feature is the presence of five pairs of powder-down patches, two of which are dorsal, two ventral, and one lateral, and there are also four bare tracts on the body which extend for some distance up the

neck. The skeleton possesses some curious combinations, such as the slit (schizognathous) type of palate, the breast-bone with a deep notch on each side of the posterior margin, etc., which seem to suggest various relationships.

FIG. 84. — Madagascar Mesite, *Mesœnas variegata*.

The coloration of the sexes is so different that before they were fully known it was thought that two species were represented, and they were so named. Thus the adult female is a clear chestnut above, slightly more dusky on the head, with the cheeks, ear-coverts, and sides of the neck bright rufous, with a dusky

band bordered by a white streak from the ear coverts down the sides of the neck. The throat and breast are rufous, slightly mottled with dark ashy margins to some of the feathers, while the sides of the body are dull reddish brown. The full-plumaged male is maroon rufous shaded with black above, becoming darker on the head, the cheeks crossed by two bands of whitish alternating with bands of rufous, while below, the throat, breast, and abdomen are white sprinkled with black spots and the flanks rufous barred with brown.

This bird, according to Messrs. Milne-Edwards and Grandidier, is not uncommon on the eastern slope of the mountain chain of Madagascar, where it is observed on the ground among tangled vegetation. It does not fly but runs with great rapidity, stopping suddenly now and again with elevated head to gaze at the intruder, or to utter its low, dull cry of *hou-hou*. It feeds on various insects and ants, and constructs its nest of rushes, Pandanus leaves, and interlaced branchlets, on the ground. According to native tradition, if the nest, which is placed on low ground, is threatened with inundation, the birds pull it to a place of safety beyond the reach of the water. It is said to be much attached to its young, and if these be taken from the nest will follow the despoilers through the forest and even into the village, and on account of this affectionate regard for its progeny is held sacred by the natives. The eggs and nestlings do not appear to have been seen by scientific eyes.

There are grave differences of opinion as to the proper systematic position of *Mesœnas*, and it has been variously placed among the Rails, Cranes, and even with the singing birds (*Oscines*), but all things considered, according to Gadow, it is perhaps best considered as referable to an anomalous suborder of the present group.

THE HEMIPODES, OR BUSTARD-QUAILS

(Suborder *Turnices*)

Although not of great importance, it is necessary to mention briefly the curious little Bustard-Quails, or Hemipodes, as they are called from the fact that the first toe is absent, except in one species. They are small terrestrial birds, none of them exceeding seven and one half inches in length and most of them being between five and six inches long, that in outward appearance are strongly suggestive of miniature Quails and Partridges. They are, however, really very different from them, and recent investigation has seemed to indicate that their nearest relatives are among the Rails, but in absence of detailed studies of all the forms, they may conveniently remain in the present position. The females are uniformly larger than the males, and more brightly colored, and as another interesting feature it may be mentioned that the males perform the duties of incubation and caring for the young. The nests are described as very simple affairs, being merely grass-lined depressions in the ground, and the number of eggs is said to be always four. The eggs are double-spotted as are the eggs of the Sand Grouse and Rails, thus indicating another possible point of relationship between them. The young are covered with down and are able to run about

very soon after they are hatched, and they frequent much the same places as the smaller Partridges and Quails, feeding upon seeds, berries, and fruits, and although small they are quite highly prized as "game birds." They run with swiftness and fly rapidly for short distances when flushed. The Hemipodes are all natives of the Old World, being widely spread over Africa, southeastern Asia and adjacent islands, and Australia. Two genera and about thirty species are known,

Fig. 85. — Bustard-Quail, *Turnix pugnax*.

all but one belonging to the genus *Turnix*, which is sometimes separated as a family (*Turnicidæ*), while the remaining form is made the type of another family (*Pedionomidæ*).

The subject of our illustration is the typical and perhaps best-known species (*T. pugnax*), which ranges widely over the Indian peninsula, Ceylon, Indo-China, Malay Peninsula, Sumatra, Borneo, and Java. It belongs to the group in which the entire breast is barred transversely with black, the lower parts

immaculate, and the sexes different in plumage; the male is five and six tenths inches in length and the female six and seven tenths inches. The curious little Collared Hemipode (*Pedionomus torquatus*) of Australia may be briefly described. The male, which is only four and one half inches long, has the top of the head, back, and upper surface mottled with black, brown, and fawn-color, the throat, neck, chest, and flanks dull fawn-color, and the center of the abdomen and the under tail-coverts buffy white. The irides are straw-yellow and the feet greenish yellow. In the female, which has a total length of seven inches, the upper surface is reddish brown, each feather with several transverse crescent-shaped marks in the center, and margined with buff; the crown of the head is reddish brown, speckled with black, while the neck is surrounded by a broad band of white, which is thickly spotted with black. The under surface is buff, the feathers being marked as are those on the upper surface. It inhabits the extensive arid plains of central Australia.

THE GAME BIRDS

(Suborder *Galli*)

The Game Birds, so called, form a very large and widely distributed group, the members of which are so well known the world over that it is hardly necessary to enter into a lengthy general description. Briefly it may be stated that they are birds with stout, compact bodies, a moderately long neck surmounted by a rather large, rounded head which is provided with a usually stout bill, the upper mandible of which is arched or vaulted and more or less overhangs the lower. The wings are rather short and rounded and are concave and fit closely to the body, while the tail is in general of moderate size, although there are notable exceptions to this, as in certain Quails, which have the tail so small as to be nearly concealed by the tail-coverts, while the other extreme is exhibited among the Pheasants, where it is very greatly elongated. The legs are of moderate length, but are always strong, for these birds are mainly terrestrial and depend much upon the legs for escaping danger; they are all four-toed.

The suborder *Galli* is divisible into two groups,—the *Peristeropodes*, or Pigeon-toed fowls, so named from the fact that the hind toe is inserted on the same level as the others, and the *Alectoropodes*, or Cock-toed fowls, which have the hind toe inserted much above the level of the others, as in the common fowl. The first group comprises the families *Megapodidæ*, the Megapodes, or Mound-Builders, and the *Cracidæ*, or Curassows and Guans. The Megapodes are confined to the Austro-Malayan subregion, and as will be shown more at length, deposit their very large eggs in the sand or in heaps of decaying vegetation, while the Curassows and their allies are found only in Central and South America, and build nests and incubate their eggs in the orthodox manner, though the nest is built in trees and not on the ground, in the manner of all *Alectoropodes*. In both families the aftershafts of the feathers are always small, and while there are numerous structural characters which separate them, we may only mention

that in the Megapodes the oil-gland at the base of the tail is naked, and in the Curassows it is tufted. The second group (*Alectoropodes*) comprises the majority of the members of the order, although it embraces but a single family (*Phasianidæ*), which is divided into four or more subfamilies as follows: the *Meleagrinæ*, or Turkeys of North and Central America; the *Numidinæ*, or Guinea-Fowls of Africa and Madagascar; the *Tetraoninæ*, or Grouse, Ptarmigan, and Quails of wide distribution; and the *Phasianinæ*, or the Fowls, Pheasants, and Peacocks of Asia. The further differentiation of these subfamilies will be presented under the several headings.

THE MEGAPODES

(Family *Megapodidæ*)

Although clearly gallinaceous in structure, the Megapodes stand out boldly from all known birds in a number of marked peculiarities. They are the only birds known to depend wholly on artificial incubation for their eggs, thus being, as Dr. Stejneger has said, "the first feathered inventors of an artificial incubator to take the place of the mother and provide the warmth necessary to develop the embryo contained in the eggs into a perfect chick, which is ordinarily supplied by the parent's body." They are also the only birds known in which the young are hatched fully feathered and able to fly from birth.

The Megapodes are mostly plain, dark-colored birds, approximating in size the common fowl, although some, as the Brush Turkey, are as large as a hen Turkey. They have very large legs and feet, with long, curved claws, and have the first toe on the same level as the others. They are found in Australia, New Guinea, and the Philippines, and are usually met with in pairs or small parties, although the species in the Nicobar Islands (*Megapodius nicobariensis*) is often found in flocks of from thirty to fifty. They remain in the vicinity of the seashore or along streams, frequenting the dense brush, where they live on a variety of things, as roots, fallen fruit, insects, worms, snails, and centipedes. The flesh, however, is white and well flavored. They are rather difficult to observe, as they run swiftly when alarmed; when flushed they fly heavily and with much noise.

The Megapodes, of which seven genera and about thirty species have been described, first attracted attention more than three hundred years ago, when one of the survivors of Magellan's voyage mentioned the curious nesting habits of the Philippine species. Soon other observations were added to this, and nesting habits that at first seemed impossible came to be authenticated.

In the manner of the preparation of these curious artificial incubators the Megapodes may be divided into two groups, — the so-called Mound-builders and the Malcos. In the first group the birds scratch or kick together great mounds of rubbish, consisting of dirt, grass, leaves, and rotten wood, in the midst of which they deposit their eggs. The mounds differ greatly in size, some being only a few feet across, while others may be ten, fifteen, or thirty feet across, and often six feet high, and one of extraordinary size, described from the island of Nogo, was one hundred and fifty feet in circumference. They are usually of

conical shape, although some have been seen in the form of a long bank, nearly thirty feet in length, and more than five feet in height. It appears that both males and females work in the construction of these mounds, which are begun some weeks previous to the period of laying, in the case of new ones, although they are often used from year to year by simply adding more material. While the evidence is somewhat conflicting, it appears beyond doubt that in some of the species at least several pairs take part in the building and jointly occupy the mound, as a considerable number of eggs have been taken from a single mound. Other observers insist that only one pair occupy a mound.

The eggs are of enormous size, considering the size of the bird, being from three to three and a quarter inches long and from two to two and a quarter inches in short diameter. They appear to be deposited at long intervals, as Davidson dissected a Megapode that had just laid an egg and found that the largest egg in the ovary was only the size of a large pea. According to Wallace, the interval is some twelve or thirteen days. The number laid by a single female is unknown, but appears to range from four to eight. The egg is deposited at night and the male is said to scratch the hole in the mound for its reception. The hole usually runs obliquely and the egg is placed in the bottom, often nearer to the side of the mound than the top; the depth varies from four to six feet. The egg is covered with the decaying vegetable matter and left to be hatched, and how the chick can get out is a mystery, but get out it does, and runs off into the forest, where it is able to look out for itself from the first.

Fig. 86.—Brush Turkey, *Talegallus lathami*.

Of the true Megapodes (*Megapodius*), seventeen species have been described, among them being two species that are fairly well known, namely, the Philippine Megapode (*M. cumingi*) and the nearly related Sangi Island Megapode (*M. sanghirensis*). Slightly different is Wallace's Megapode (*Eulipoa wallacei*) of the Molucca Islands and the Ocellated Megapode (*Lipoa ocellata*) of western and southern Australia. Of the true Brush Turkeys (*Talegallus*) four species, all of New Guinea and neighboring islands, have been described, with four allied forms (*Catheturus* and *Æpypodius*) from Australia and New Guinea.

The only remaining form is the Maleo (*Megacephalon maleo*) of the Celebes and Sangi islands, which differs in structure and in habits from the others. It does not build a mound, but deposits its eggs in holes in the hot sand along the seashore. The following account is given by Wallace: "It is in loose, hot, black sand that the Maleos deposit their eggs. In the months of August and September, when there is little or no rain, they come down in pairs from the interior to this or one or two other favorite spots, and scratch holes three or four feet deep, just above high-water mark, where the female deposits a single large egg, which she covers over with about a foot of sand, and then returns to the forest. At the end of ten or twelve days she comes again to the same spot to

lay another egg, and each female is supposed to lay six or eight eggs during the season. The male assists the female in making the hole, coming down and returning with her. The appearance of the bird when walking on the beach is very handsome. The glossy black and rosy white of the plumage, the helmeted head and elevated tail, like that of the common fowl, give a striking character. . . . Many birds lay in the same hole, for a dozen eggs are often found together, and these are so large that it is not possible for the body of the bird to contain more than one fully developed egg at the same time. After the eggs are deposited in the sand they are no further cared for by the mother. The young birds on

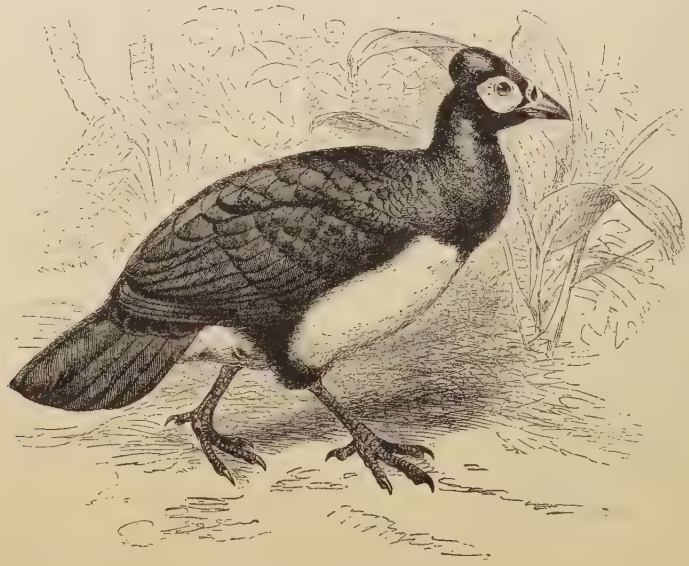


Fig. 87.—Maleo, *Megacephalon maleo.*

breaking the shell work their way up through the sand and run off at once to the forest. Considering the great distances the birds come to deposit the eggs in a proper situation (often ten or fifteen miles), it seems extraordinary that they should take no further care of them. It is, however, quite certain that they neither do nor can watch them."

That the nesting habits of the Megapodes are admirably adapted to the present structure and life of the birds is beyond question; but how these habits could have originated in the first place is difficult to understand. Under present conditions, if the birds were required to incubate their eggs, serious difficulties would arise. With an interval of ten or twelve days between the laying of each egg, a period of some two or three months would elapse between the first and last egg. If the eggs were left until the last was laid, the first ones would be subjected to climatic injuries as well as destruction by predatory animals; while

if the female began incubation with the laying of the first egg, it would require her to remain sitting for three months, which would be impossible. It has been suggested that these nesting habits may be the survival of a habit enjoyed by a remote reptilian ancestor, but this is too improbable. Others have suggested that it arose by the birds covering up and concealing their eggs, which seems not unreasonable; yet if this be true, it is difficult to see how they could have become developed to the point where the young can fly from the time of exit from the shell!

THE CURASSOWS AND GUANS

(Family *Cracidæ*)

Among the many birds confined to the New World not any are more eminently characteristic than the Curassows and Guans of Central and South America. In common with the Megapodes they have the hind toe well developed and inserted on the same level as the front ones, while they differ from them in having a tuft of feathers on the oil-gland, and, moreover, are distinctly arboreal instead of terrestrial, usually building their nests in trees and bushes and laying eggs of the usual kind and rearing their young as well-regulated birds should. They are large and on the whole rather striking and handsome birds, between sixteen and thirty-six inches in length, and are mostly provided with a crest or other ornamental enlargement on the head. They number about a dozen genera and sixty species, only one of which reaches the United States in the lower valley of the Rio Grande in Texas. They may be divided into two groups, in one the upper mandible being higher than broad, and in the other being broader than high. To the first belongs the true **Curassows** (*Crax*), which are all birds of large size with a semi-erect crest on the top of the head, the feathers of which are curled at the tips. They are all quite similar in appearance, the males being black above, glossed with purple or dark green, and white below, the crests being uniform black and never barred with white, while the females are more or less barred with black, white, rufous, buff, etc., and have the crest always more or less white-barred. The species are distinguished on minor considerations, as the presence or absence of a knob at the base of the upper mandible, wattles at the base of the lower mandible, white-tipped tail, etc. The males in common with others of the group have a long and convoluted windpipe and hence a loud and rather harsh voice. They frequent usually the loftiest trees, going in flocks of considerable size, and building a bulky nest of sticks, leaves, and grass, wherein are deposited the large white eggs. The Curassows are of a quiet, confiding disposition, and as some of them breed readily in captivity are often tamed by the inhabitants and reared for their excellent flesh. The Mexican Curassow (*Crax globicera*) was found by Richmond to be abundant on the Frio and Escondido rivers, where it is often kept in captivity. "A fine male," he says, "on the Magnolia plantation was very tame, and answered to the name of '*Touie*.' One of *Touie's* peculiarities was an abhorrence of women. The

Fig. 88. — Sclater's Curassow, *Crax fasciolata*.

moment a dress appeared on the plantation he began to show great distress, uttering his low, plaintive whistle, and running often to the object of his wrath, with body leaning forward and almost brushing the ground, head thrown back and tail raised, giving him a laughable appearance. After picking at the offend-

ing dress and following its wearer about for a time, *Tonie* would quiet down a bit, but would continue to sulk and utter his note of complaint until the cause of the trouble had departed. The bird raised his crest when excited, but on other occasions kept it depressed." The Crested Curassow (*C. alector*) is another handsome species in which the male is black glossed with purple, except on the abdomen, flanks, and under tail coverts, which are white. This bird is very abundant in French Guiana, frequenting the vast forests in flocks of large size. They perch on the high trees, but also spend much time on the ground searching for fruits and nuts, which constitute the principal part of their food. The nest is placed in a tree, and the eggs, from two to six in number, are pure white. Sclater's Curassow (*C. fasciolata*) is similar to the last, but has the plumage glossed with dark green, and the tail tipped with white; it occurs widely throughout the forests of eastern South America.

Fig. 89. — Crested Curassow, *Crax alector*.

Flat-crested and Helmeted Curassows. — There is a singular species found in British Guiana and the upper Amazons known as the Flat-crested Curassow (*Nothocrax urumutum*), from the fact that the full long crest on the top of the head is recumbent. The male is brownish chestnut, finely mottled with black above and cinnamon below, while the crest is black, the bare space about the eyes purplish blue, and the bill scarlet. The female is somewhat more dusky and smaller. This bird appears to be strictly nocturnal in its habits, spending the day concealed in holes in trees or in the ground, and seeking its food high up in the trees at night. Of this peculiarity Mr. E. Bartlett says: "The habits of this bird render it most difficult to obtain, from its living in holes or burrows in the ground. The Indians remain in the forest all night at the place where it is heard. I was informed by the Peruvians, whose word I can rely upon, that these birds come out at night, and ascend to the top branches of lofty trees in search of food. The Indians are on the lookout, and shoot them just before sunrise as they are descending to return to their places of concealment, where they pass the day." The last of this minor group that we may mention is the Helmeted Curassow (*Pauxis pauxi*), which may be known by the presence of a large, elevated, egg-shaped helmet or casque covering the base of the upper mandible and forehead. Like the others the general color of the plumage is black, which in this species is glossed with dark green. This bird is confined mainly to the mountain forests, being especially abundant in Venezuela.

Fig. 90.—Wagler's Guan, *Ortalis wagleri*.

Derbian Guan. — One of the most interesting and at the same time one of the rarest of those in which the bill is broader than high is the so-called Mountain Pheasant, or Derbian Guan (*Oreophasis derbianus*), which is mainly confined to the woods about the Volcan de Fuego, Guatemala. It has a straight, slender, cylindrical casque on the top of the head between the eyes, this together with the legs and feet being deep vermilion in color. These birds seek their food, which consists largely of the fruits of a kind of plum, in the early morning and evening among the high trees, but during the middle of the day they descend to the ground, where they remain basking and scratching among the leaves. The nest and eggs are not known.

The **Guans**, or **Chachalacas** (*Ortalis*), constitute the larger genus among the Curassows, numbering twenty or more species and subspecies. The sexes are similar in appearance, the colors being plain olive-brownish or olive-grayish above, darker on the tail, and chestnut-rufous, light brownish, or whitish below. The top of the head is feathered and without the casque or helmet characteristic of certain of the other Curassows, and there is a band of these feathers down the middle of the otherwise naked throat. We may mention briefly the Chachalaca (*O. vetula maccalli*), the only form reaching the United States. Of the habits of this species in southern Texas the late Dr. J. C. Merrill wrote as follows: "The 'Chachalac,' as the present species is called on the lower Rio Grande, is one of the most characteristic birds of that region. Rarely seen any distance from the woods or dense chaparral, they are abundant in those places, and their hoarse cries are the first thing heard by the traveler on awakening in the morning. During the day, unless rainy or cloudy, the birds are rarely seen or heard, but shortly before sunrise and sunset they mount the topmost branches of a dead tree, and make the woods ring with their discordant notes. Contrary to almost every description of their cry which I have seen, it consists of three syllables, though occasionally a fourth is added. When the bird begins to cry, the nearest bird joins in at the second note, and in this way the fourth syllable is made; but they keep such good time that it is often very difficult to satisfy oneself that this is the fact. I cannot say certainly whether the female utters this cry as well as the male, but there is a well-marked anatomical distinction in the sexes in regard to the development of the trachea. In the male this passes down the outside of the pectoral muscles, beneath the skin, to within one inch of the end of the sternum; it then doubles on itself and passes up, still on the right side of the keel, to descend within the thorax in the usual manner. This duplicature is wanting in the female . . . Easily domesticated, they become troublesomely familiar and decided nuisances when kept about the house." The nests in this vicinity were placed in the dense mesquite bushes, especially where the limbs had been cut away, and in the cluster of branches thus left there usually accumulated a mass of leaves and twigs within which the nest was rudely shaped. The eggs number from three to five. Similar to the Guans are the Penelopes (*Penelope*), but distinguished among other things by having the chin and throat usually naked and provided with a central wattle, and a large, naked space around the eye. Their habits are similar to those of the other members of the group.

THE TRUE GAME BIRDS

(Family *Phasianidæ*)

The characters and limitations of this group have already been set forth, the first of the four subfamilies into which it is divided comprising the **Turkeys** (Subfamily *Meleagrinæ*).

Notwithstanding the obvious implication involved in the name, the Turkeys are all natives of the New World, and the manner in which this popular designation came to be applied has long been — and indeed still is — a mystery, though it has been suggested that it was given in imitation of their call note, likened to the syllables *turk*, *turk*, *turk*. In some equally unexplained manner it appears that they were confused with the African Guinea-Fowl by the early writers, even the great Linnæus falling into this error. So, also, the date in which they were introduced into the Old World is largely a matter of speculation, though it had certainly been accomplished by 1530, and very probably somewhat earlier. It is more than likely that there were several, perhaps approximately simultaneous, importations, since at least two of the races seem to have been early present, at least in England.

The Wild Turkey, the largest of our game birds, ranges in eastern North America, or rather once did, from Maine, southern Wisconsin, and Dakota southward to the Gulf and westward over Texas, New Mexico, and Arizona into the table-lands of Mexico, being represented in Central America by the very distinct monotypic Ocellated Turkey. When this country was first settled the Wild Turkey was found abundantly in many localities, such as southern New England and the states of the Middle West, but with the advent of civilization it has greatly decreased, until it is now practically extinct north of the Ohio River, and even in the Middle and Southern States it is comparatively rare, being mainly confined to the thinly settled and wooded mountainous districts. Originally it does not appear to have been particularly wild, but continued and persistent persecution has made it excessively shy and difficult of approach. It is perhaps most abundant now in portions of Florida, Indian Territory, and Texas, but at the present outlook it seems not improbable that the close of the twentieth century may see it practically extinct in a wild state. It is resident where found, inhabiting by preference rather mixed woods, where it seeks its food of acorns, beechnuts, seeds, nuts, berries, and insects of various kinds, often scratching extensively amongst the leaves. The males are polygamous and often engage in fierce battles for the favor of the females, and may often be seen in the display attitudes so characteristic of the domestic bird. The nest is a very simple affair, though often artfully concealed, consisting of a hollow scratched in the ground to a depth of two or three inches and lined with a few grasses and dead leaves. The eggs appear to vary in number from seven to fifteen, though as many as twenty-six have been reported, but these were probably deposited by two females. The young are cared for almost entirely by the female, and usually but a single brood is reared in a season, unless the first happens to be destroyed.

Fig. 93.—Helmeted Guinea-Fowl, *Numida mitrata*.

and June, makes a peculiar drumming noise, which is very deep and sonorous; "after this he utters his peculiar song, which resembles the rapid pecking of a distant Woodpecker or the song of the great bull toad."

The nests and eggs are closely similar to those of the Common Wild Turkey.

The Guinea-Fowls (subfamily *Numidinæ*), typified by the well-known domestic bird, are all natives of Africa and take their name from the country whence they were first introduced into Europe. As at present accepted, the group includes five genera and some twenty-three species, although two West African species, the Black Guinea-Fowl (*Phasidus niger*) and the Turkey Guinea-Fowl (*Agelastes meleagrides*), are anomalous in a number of particulars, and have sometimes been separated as a distinct subfamily.

The true Guinea-Fowls (*Numida*), of which fourteen species are well known, are characterized by having the upper part of the head bare and elevated in the center into a bony crest or helmet. The common domestic species (*N. meleagris*) is found wild in West Africa from Senegambia to the Niger, and also in the Cape Verde Islands, and in some of the West Indies, where it was, of course, introduced. It is too well known to require description, as it has been changed very little by domestication. The Guinea-Fowls are gregarious, often gathering in large flocks, but they are extremely wild and difficult of approach. They escape by running with great swiftness, although they fly strongly when flushed. The species are all rather closely allied, the illustration being of Pallas's Helmeted Guinea-Fowl (*N. mitrata*) of East Africa and Madagascar.

The Crested Guinea-Fowls (*Guttera*) have a thick tuft of feathers on the top of the head instead of the bony helmet, but otherwise differ but little from the true Guinea-Fowls. One of the best of the six known species now recognized is *G. cristata*, found in West Africa from Sierra Leone to the Gold Coast. The plumage is black, spotted with pale blue, and the crest black, while some four or five of the outer secondaries are pure white, thus producing a white band when the wing is closed. There is also a black collar.

The Vulturine Guinea-Fowl (*Acryllium vulturinum*) is by far the handsomest of the group. It is native from Somaliland to Kilimanjaro, and has the head and upper part of the neck naked and covered with cobalt-blue skin, with the exception of a patch of short chestnut feathers on the nape. The lower part of the neck and the upper portion of the back and breast are covered with long, narrow feathers, each having a white shaft-stripe with cobalt-blue margins. The mantle is black, minutely dotted with white, while the flanks are purple spotted with white, and the middle of the breast a beautiful cobalt-blue. The tail, which has the middle feathers long, narrow, and pointed, is similarly colored.

The Black Guinea-Fowl and the Turkey Guinea-Fowl, as above stated, are peculiar in having spurs, thus approaching the Jungle-Fowls. They are handsome birds, but extremely rare, and practically nothing is known of their habits.

The Grouse, Partridges, and Quails (subfamily *Tetraoninæ*). —This important and well-known group, embracing as it does by far the greater number of valuable non-aquatic game birds, merits a very full and careful presentation. Although perhaps most abundantly represented in the Northern Hemisphere, they are nearly world-wide in distribution, and are especially well represented in North America. The group comprises about one hundred and twenty-five species, disposed in some twenty-three genera, which are distinguished from the Pheasants, among other characters, by the absence of spurs

on the tarsi, and by having the head entirely feathered except sometimes over the eyes. Although as thus circumscribed they form a relatively compact group, there are considerable differences, not only in size, but in certain minor characters, which serve as a basis for separating them into several small well marked groups that have at times been regarded as of subfamily or even higher rank. In the first of these that we shall consider, embracing the Grouse, Partridges, etc., the nostrils are wholly feathered and the tarsus is half or usually entirely hidden by feathers, while in some the feathering extends quite to the tip of the toes.

Ptarmigan. — Of all the various members of this group none is more interesting in many particulars than the Ptarmigan (*Lagopus*), of which some fifteen species and subspecies are recognized. They are circumpolar in distribution, and while as at present understood are most numerously represented in North America, it is probable that when thoroughly studied, it will be found that the Old World is nearly, if not quite, as rich in recognizable forms. Their most prominent peculiarity is the striking seasonal change of plumage which they undergo, these changes being not only more marked than in any other member of this group, but are perhaps the most pronounced enjoyed by any birds. With one exception, all the species have three or even four, more or less complete changes of plumage, that in winter being chiefly, or entirely, pure white, while at other seasons it is varied with brown, buff, gray, and black. As they live mainly in the high, Arctic lands or on rugged, snow-covered mountains, these changes admirably adapt them to their surroundings and afford a means of protection from their numerous enemies. To show how strikingly different they are at the various seasons, the following rather full description is given of a male Rock Ptarmigan (*Lagopus rupestris*): In winter, as stated above, the plumage is pure white, with the exception of the outer tail-feathers and lores, which are black. In summer the ground color is grayish brown, "coarsely vermiculated with black, the vermiculations having a tendency to form irregular zigzag bars; the scapulars and interscapulars are largely black centrally, producing large blotches or irregular spots; the outermost wing-coverts, quills, and secondaries white; lores black; rest of head mixed dusky and white; chest, upper breast, and sides regularly barred with blackish and light umber-brown, while the remainder of the lower parts are white." This gives place in fall to a pale brownish ground-color of the upper parts, variously freckled and spotted, while the wings are much as in the summer condition, and the chest, upper breast, sides, and flanks are much like the upper parts, but are without black spots. The female enjoys a similar change, but is bright ochraceous in summer, irregularly spotted and barred above with black, and is more distantly barred below. These changes are so pronounced, and follow each other with such quick succession, that they have been supposed to lend support to the theory that it was possible to have a change of plumage without moult, but this has been so thoroughly exploded of late that it is not necessary to further refer to it. Mr. J. G. Millais, who has enjoyed exceptional opportunities of observing the change of plumage in the common European Ptarmigan (*L. mutus*), has given, in his

entertaining "Game Birds and Shooting Sketches," a very full account of the changes for an entire year, but lack of space forbids our quoting it. Although it is nearly impossible to distinguish many of the Ptarmigan in winter plumage, which has led to the denial of their specific rank by certain writers, the other plumages afford a reasonably satisfactory basis for delimiting them.

Willow Ptarmigan. — The Ptarmigan are compact-bodied, typically Grouse-like birds ranging from twelve to about seventeen inches in length, and may be known at once by having the tarsi, feet, and toes completely and densely feathered. The tail is composed of sixteen feathers which are of nearly equal length. Of the various species we may appropriately begin with the Willow Ptarmigan, or Willow Grouse (*L. lagopus*), as it is often called, which is found throughout the northern portions of the Northern Hemisphere. It is fifteen or fifteen and one half inches long, both sexes in winter being pure white, with all the tail-feathers except the middle pair black. In North America they are confined during the nesting season to the fur countries; but in winter they are more or less migratory, coming south often in great numbers as far as Manitoba, and occasionally entering the northern border of the United States. In spring as soon as the snow begins to melt they repair to the lower grounds and prepare for the nuptial season, and may soon be heard uttering their peculiar hoarse call. Turner tells us that in order to attract the attention of the female the male resorts to the highest portions of the tract, "whence he launches into the air, uttering a barking sound of nearly a dozen notes, thence sails or flutters in a circle to alight at the place whence he started. Immediately on alighting he utters a sound similar to the Indian word *chee-xwan* (what is it?) and repeats it several times, and in the course of a few minutes again launches in the air. Early in the morning hundreds of these birds may be heard, continuing until nearly eleven o'clock, when the bird then becomes silent until about three o'clock, when he again goes through the same performance." Each male guards his territory against others of his kind, and when an intruder comes, "battles ensue which for fierceness are seldom equaled by birds of larger size." The nest, always placed on the ground, is a mere depression in the mosses and perhaps lined with a few blades or stalks of grass. The eggs usually vary in number between seven and thirteen, but as many as seventeen and even twenty have been reported, which would seem to indicate that two females may occasionally deposit eggs in the same nest; this, however, is not confirmed by actual observation. In color the eggs range from cream to reddish buff overlaid with spots and blotches of reddish brown. The female sits very closely and will sometimes permit herself to be trodden on or even taken in the hand before attempting to leave. On other occasions the female will flutter off, or call out in distressed tones, and act as if she had been severely wounded. The period of incubation is thought by Turner to be seventeen days, and when the chicks are hatched, both parents display great courage and devotion in protecting them. By November 1 the young birds have attained their full growth, when all associate in flocks often of great size, though in winter MacFarlane states that in the neighborhood of Fort Anderson it is rare to find more than two or three dozen together. They feed upon buds, seeds,

and berries. A subspecies of this, known as Allen's Ptarmigan (*L. lagopus alleni*), is confined to Newfoundland, and differs from the typical form in having the shafts of the secondaries black instead of white, and according to Dr. Merriam, "frequents rocky barrens, feeding on seeds and berries of the stunted plants that thrive in these exposed situations."

The **Rock Ptarmigan** (*L. rupestris*), the seasonal changes of plumage of which were described above, is also found in Arctic America and in northern Asia as far as the Ural Mountains. In this country its nesting range extends from the Alaska peninsula and Bering Strait along the Arctic coast and through the Barren Grounds to the west coast of Hudson's Bay and Labrador. Nelson, for example, found it to be a common resident of the Alaskan mainland, frequenting "the summits of the low hills and mountains during the summer season, where it remains until the severe weather of early winter forces it down to the lower elevations and under the shelter of the bush-bordered ravines and furrows." In the vast Barren Grounds it is also at home, subsisting on seeds, berries, and buds, like its relative just described. The nest is said to be placed among the dwarf birches and willows, and on the sedge covered tundras, the eggs varying in number from six to ten. A number of subspecies of this have been differentiated, as the Greenland Ptarmigan (*L. r. reinhardti*) of Greenland, the islands on the western side of Cumberland Gulf, and northern Labrador; Nelson's Ptarmigan (*L. r. nelsoni*), of the island of Unalaska; Turner's Ptarmigan (*L. r. atkhensis*), of the neighboring island of Atkha; and Evermann's Ptarmigan (*L. r. evermanni*) of Attu Island, while the closely allied Welch's Ptarmigan (*L. welchi*) is confined to Newfoundland. These forms are all very close and by some authorities are not accepted as valid, though no one who has carefully studied these birds but has easily been convinced of their distinctness.

White-tailed Ptarmigan. — The smallest, as well as one of the handsomest and most distinct, species is the White-tailed Ptarmigan (*L. leucurus*) of the Alpine summits of the Rocky Mountains from Alaska to New Mexico and west to the higher mountains of Oregon and Washington. It is only twelve or thirteen inches in length and may otherwise be known by the plumage being white throughout, including all the feathers of the tail. According to Major Bendire, "It is a resident and breeds wherever found, rarely leaving the mountain summits, even during the severest winter weather, and then only descending 2000 or 3000 feet at most, seldom being found at a lower altitude than 8000 or 9000 feet at any time." This altitude usually takes

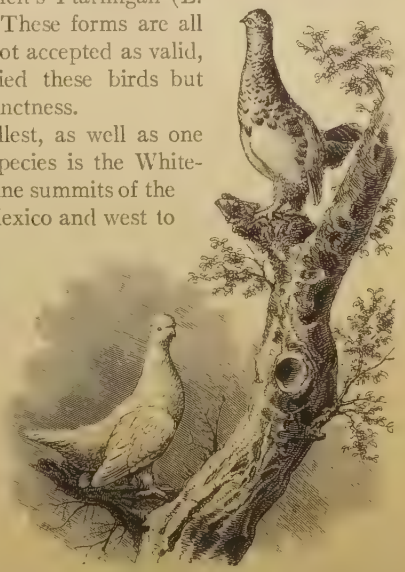


FIG. 94. — White-tailed Ptarmigan, *Lagopus leucurus*.

them high above the timber line, and here, where the wind is often blowing with such tremendous sweep that it is difficult for a man to stand against it, they may be found crouching behind a small stone or other shelter, and always with the head toward the wind. They associate usually in small parties and if disturbed all take wing at once, resembling a flock of white Pigeons. They are usually rather tame and when closely approached run about nervously with the tail elevated and looking, as Mr. Grinnell says, "very much like a white Fantailed Pigeon." The nest, usually begun sometime in June, is a slight depression among the rocky débris of steep hillsides, and although in perfectly exposed situations, the mottled plumage of the female at this season is so very like the surrounding rocks and ground that she is effectually concealed. The female sits so closely that she may almost be trodden upon before betraying her presence, and may even be stroked and lifted from the nest without more protest than a sitting hen. The eggs are usually from seven to nine in number and are creamy or reddish buff with few markings. The female only appears to perform the duty of incubation, and when the chicks are hatched cares for them with great solicitude. These birds feed largely on buds, with such seeds and berries as they can secure.

Red Grouse. — The remaining member of this genus that we shall consider is the very distinct Red Grouse (*L. scoticus*) of Great Britain, which has the distinction of being the only species of bird confined to the British Islands. It is also the only Ptarmigan that does not have a pure white winter plumage, its usual dress being reddish or chestnut-brown, barred and speckled with black, while the breast is almost black. In summer the general color is a little lighter, and in winter the under parts are often more or less mottled with white. It frequents the mountains and moors, feeding on shoots of the heather as well as buds, leaves, seeds, and fruits of such plants as grow on or near the moors, although the young chicks are said to be fed chiefly on small caterpillars.

Black Grouse. — Of the remaining genera of Grouse none have the toes feathered, but instead all have the sides of the toes pectinated in winter, with the points deciduous in summer. Otherwise not far removed from those last considered are the Black Grouse (*Lyrurus*) of the northern portions of the Old World, in which the tarsi are entirely feathered and the tail of eighteen feathers has the outer pairs very much longer than the middle pair, and in the male these are curved outwards at the extremity. Only three or four species are known, the most important being the common Black Grouse (*L. tetrix*) of Europe and northern and central Asia. The full-grown male is about twenty-three inches long, while the length of the female is only about seventeen inches. The general color of the male is black with violet reflections, relieved by a broad white wing-band and white-tipped secondaries. There is also a white spot behind the eye, and the naked skin and wattle above the eye are scarlet. The female, often called the Gray-hen, is mostly rufous, barred with black above, and dusky brown barred with red and whitish below. The true home of this species is in the birch and pine forests, but it is also found on the open moors and fields, especially grain and stubble fields, often at some distance from cover. The old birds feed

largely on grain, seeds, berries, and buds, while the young are fed mainly on the larvæ of ants and other insects. The male Black Grouse is polygamous, that is, associates with several females, and for their edification often goes through many curious antics, such as strutting to and fro with trailing wings and expanded tail. If a rival male appears, a fierce conflict is sure to ensue, this lasting until both are thoroughly exhausted or one or the other vanquished. The nest is usually a slight affair, placed under a bush or bunch of weeds and grass, and the eggs, six to ten in number, are yellowish white with rich brown spots. The female performs the entire task of incubating the eggs and rearing the young, the males betaking themselves away as soon as incubation commences. The other best-known species is the Caucasian Black Grouse (*L. mlokosiewiczi*), which is found only in the Caucasian Mountains; it is a smaller bird and has the plumage black throughout.

Capercaillies. — Also confined to the Old World are the Capercaillies (*Tetrao*), of which four species and a number of hybrids are known. They are large birds, the males being thirty or thirty-five inches long and weighing ten or twelve pounds, while the females are some twelve inches shorter and only weigh four or five pounds. The tail is composed of eighteen feathers, as in the Black Grouse, but it is the middle instead of the outer pair that is longest, thus producing a rounded or slightly wedge-shaped tail. The Capercaillies are inhabitants mainly of coniferous forests, feeding, especially during the winter, on the tender shoots of the pine and spruce, but at other seasons they search for seeds, fruits, grain, etc., often at considerable distance from the woods. The male is polygamous, and at the beginning of the nesting season mounts to the top of some tall tree and utters his loud note, which is a call to the females and a challenge to other males. Should another male approach, a battle is certain, which often lasts until both are bleeding and torn, and so exhausted that they may frequently be captured in the hand. Ordinarily, the male is extremely wary and although so large and heavy flies with little or no noise and very rapidly. The best-known species is the Common Capercaillie (*T. urogallus*), the male of which is dark gray above, with the wings brown speckled with black, while the chest is lustrous green and the abdomen black with white spots. The female is much barred and spotted with tawny red, black, and white, with the throat and breast reddish and the tail dark reddish brown with black bars. This species is found in the pine forests of Europe and northern and central Asia, being originally also a native of the British Islands, where it was entirely exterminated about the middle of the last century, but was later introduced from Sweden and is now firmly established and abundant in many parts of north Britain and appears to be gradually spreading to new territory. It frequently crosses with the Black Grouse, and the male hybrid is hardly to be distinguished from the Gray-hen except in size. It has also been known to cross with the English Pheasant and the Willow Ptarmigan. The handsomest member of the genus is the Ural Capercaillie (*T. uralensis*) of the Ural Mountains. It is similar to the last but paler above, with the wings and shoulders light reddish brown and the lower parts mainly white. In northeast Siberia its place is taken by a slender billed

species (*T. parvirostris*), and this is replaced in Kamchatka by another (*T. kamchaticus*), which is the smallest of the genus.

Dusky, Sooty, and Richardson's Grouse. — Coming to North America, we find several fine Grouse belonging to the genus *Dendragapus*, which comprises a single species with four subspecies. They are large birds, with the tail four fifths as long as the wing, the only species being the Dusky Grouse (*D. obscurus*), which is further characterized by having a tail of twenty feathers and the male with distinct inflatable air-sacs on the sides of the neck. The plumage is dusky grayish or dull blackish above and slate-gray below. The female is similar but decidedly smaller and more or less spotted and barred with buff or brownish. The Dusky Grouse, better known as the Blue Grouse, is found in the southern Rocky Mountains from central Arizona to Idaho, South Dakota, and Nevada. It frequents the borders of wooded mountain regions below timber line, and is always resident where found. It is usually very tame and unsuspicious and when startled will frequently fly into the branches of a near-by tree and remain gazing at the intruder while perhaps shot after shot is fired at it with a pistol or rifle. If a covey of half-grown young are flushed, the whole number may sometimes be secured without one attempting to fly. Of the habits of the male during the nesting season, as observed in Colorado, Mr. Gale writes: "It you are anywhere near the haunts of a pair, you will surely hear the male and most likely see him. He may interview you on foot, strutting along before you, in short, hurried steps alternating from right to left, with widespread tail tipped forward, head down and back, and wings dragging along the ground, much in the style of a Turkey gobbler. At other times you may hear his mimic thunder overhead again and again in his flight from tree to tree. As you walk along he leads, and this reconnoitering on his part, if you are not familiar with it, may cause you to suppose that the trees are alive with these Grouse. He then takes his stand upon a rock, stump, or log, and in the manner already described distends the lower part of his neck, opens his frill of white, edged with the darker feather-tips, showing in its center a pink narrow line describing somewhat the segment of a circle, then with very little apparent motion he performs his growling or groaning, and having the strange peculiarity of seeming quite distant when quite near, and near when distant." The nest, usually well concealed, is a slight depression in the ground and scantily lined with pine needles or grasses. The complement of eggs is from seven to ten or sometimes more. Three well-marked subspecies of this are known: the Sooty Grouse (*D. o. fuliginosus*), a much darker bird of the mountains of the Northwest; the Sierra Grouse (*D. o. sierræ*), of the Sierra Nevada and Cascade Mountains; and Richardson's Grouse (*D. o. richardsonii*), of the northern Rocky Mountains, of which the last may be known by the absence of the terminal gray band on the tail. The habits are similar to those of the typical form.

Canada and Franklin's Grouse. — The two species which belong to the related genus *Canachites* differ from the preceding in the absence of the dilatable air-sac on the side of the neck and in having only sixteen feathers in the much shorter tail. They are also much smaller birds, being only fifteen or

sixteen inches long, the plumage in the male being transversely barred with blackish and grayish above, and black beneath, with a black border to the throat and many of the feathers with broad white tips; the tail is black. In the female the upper parts are barred with black, gray, and buff, while the lower parts are whitish, broadly barred with black. The species are separated largely on the marking of the tip of the tail, in the Canada Grouse (*D. canadensis*) this being rufous, while in Franklin's Grouse (*D. franklinii*) it is black to the extreme tip. The handsome little Canada Grouse, or Spruce Partridge, as it is often called, ranges throughout northern North America east of the Rocky Mountains from the northern New England States to Alaska, frequenting, as its second name implies, the coniferous forests of the northern zone, and is usually a resident wherever found. It feeds largely upon the tender shoots and leaves of the spruce and tamarack, and is quite at home in the dense groves and swamps of these trees. In summer, however, it consumes quantities of berries of various kinds, especially the crowberry, and the several kinds of blueberries. In common with a few other Grouse it has the habit of "drumming," that is, the production of a peculiar rumbling sound that has been likened to the sound of distant thunder. The manner in which this sound is produced has given rise to no little speculation, for as the "drummer" is an exceedingly wary bird, it is a matter of difficulty to catch him in the act. It is popularly supposed that the sound is made by the male beating his wings on a hollow log, but this is undoubtedly incorrect, as the following quotation from a correspondent of Bendire shows: "After strutting back and forth for a few minutes, the male flew straight up, as high as the surrounding trees, about fourteen feet; here he remained stationary an instant, and while on suspended wing did the drumming with the wings, resembling distant thunder, meanwhile dropping down slowly to the spot from where he started, to repeat the same thing over and over again." In other cases they select a tree known to woodsmen as a "drumming tree," with the trunk somewhat inclined, and, to quote from Mr. Manly Hardy, one of our best-known observers, the bird, commencing near the base of the tree selected, flutters upward with somewhat slow progress, but rapidly beating wings, which produce the drumming sound. The "drumming trees" are resorted to for several seasons and often become quite smooth and polished by constant use. The nest of this species is a depression by the side of a log or stump and usually contains from nine to thirteen eggs. Franklin's Grouse, found in the northern Rocky Mountains mainly north of the United States and westward to the coast ranges, is a rather rare bird, except in a few favored localities. It frequents especially the edges of swampy mountain valleys, or groves and thickets of spruce and tamarack along small streams. It is usually very tame and unsuspicious, permitting itself to be knocked over with a stick or stone or even taken in the hand, whence it is often called the "Fool Hen." Its nesting habits appear to be similar to those of the last species.

Prairie Hens and Heath Hen. — Passing over the Sharp-winged Grouse (*Falcipennis falcipennis*) of northeastern Asia, which resembles the Canada Grouse but differs in having the outer flight-feathers narrowed and sickle-

shaped, we come to the well-known Pinnated Grouse, or Prairie Hens (*Tympanuchus*), which make their homes on the broad prairies of the Mississippi Valley and a few other isolated but topographically similar localities. They are fine large birds, some seventeen to nineteen inches long, with a brownish and dusky barred plumage, and the males are further characterized by the presence of an erectile tuft of stiff elongated feathers, and an inflatable air-sac on each side of the neck. The females lack the air-sac and have the neck-tufts rudimentary. The principal species is the Prairie Hen, or Prairie Chicken (*T. americanus*), of the prairies of the middle West from Wisconsin and Indiana to Dakota and middle Kansas. They are usually resident wherever found, but occasionally there is some semblance of a migration during severe winters, and curiously it is only the females which change their range, the males being left to "brave the winter's cold." At the beginning of the nesting season the "love-making" of the males is an interesting spectacle. Selecting some high, dry knoll, where the grass is short, "scratching grounds" as they are called, they congregate in the early morning in parties of from a dozen to often fifty. The males inflate the air-sacs until they look "like two ripe oranges on each side of the neck," at the same time throwing forward the long black neck-tufts, ruffling up the body feathers, and dropping their wings to the ground. "Then it is," says Caton, "that the proud cock, in order to complete his triumph, will rush forward at his best speed for two or three rods through the midst of the love-sick damsels, pouring out as he goes a booming noise, almost a hoarse roar, only more subdued, which may be heard for at least two miles in the still morning air. This heavy booming sound is by no means harsh or unpleasant; on the contrary, it is soft and even harmonious. When standing in the open prairie at early dawn, listening to hundreds of different voices, pitched on different keys, coming from every direction and from various distances, the listener is rather soothed than excited. If this sound is heavier than the deep keynotes of a large organ, it is much softer, though vastly more powerful, and may be heard at a much greater distance." The birds disperse when the sun is half an hour high, to assemble the next morning, and so on for a week or two until all have made satisfactory matches. The nesting site is usually selected with little care as regards safety from disturbance, being a slight depression under a bush or among grass and weeds. Many nests are annually destroyed by the burning over of the ground, by being plowed under, or by predatory animals. The eggs are usually from eight to fourteen, though as many as twenty-one have been noted. The period of incubation is from three to four weeks, and the young run about as soon as they are out of the shell. Their care devolves entirely upon

FIG. 95.—Prairie Hen, *Tympanuchus americanus*.

the female. A well-marked subspecies, Attwater's Prairie Hen (*T. a. attwateri*), is found along the coasts of Louisiana and eastern Texas. It is lighter in color and has considerably more of the tarsus naked, while along the eastern border of the Great Plains is found the still smaller and lighter colored Lesser Prairie Hen (*T. pallidicinctus*).

The **Heath Hen** (*T. cupido*), the only remaining species, was formerly found in southern New England, Pennsylvania, Virginia, etc., but is now entirely confined to the island of Martha's Vineyard, Massachusetts, and within an area of forty square miles. In the spring of 1890, Mr. Brewster estimated that the total number of birds could hardly exceed two hundred, and it is understood that this number has since been still further reduced, perhaps almost to the point of extermination. Unlike the principal species, they are "mainly, if not exclusively, confined to the woods, haunting oak scrub by preference and feeding largely on acorns."

Sharp-tailed and Sage Grouse. Also distinctly American are the Sharp-tailed Grouse (*Pediocætes*), so called from the fact that the tail is graduated with the middle pair of feathers projecting much beyond the others; there are no elongated tufts or air-sacs on the sides of the neck. They are rather large birds, though smaller than the Prairie Hen, irregularly spotted and barred above with black and brownish, and white beneath, where there are often V-shaped markings of dusky. Three forms are known, the true Sharp-tailed Grouse (*P. phasianellus*), a very dark colored bird inhabiting the wooded districts and prairie borders of the interior of British America; the Columbian Sharp-tailed Grouse (*P. p. columbianus*), a lighter colored form of the grass-covered plains of the northwestern United States; and the Prairie Sharp-tailed Grouse (*P. p. campestris*), also a light-colored but more reddish bird, inhabiting the Great Plains. Similar to these, but differing in having the tail longer instead of shorter than the wings, is the Sage Grouse (*Centrocercus urophasianus*), which next to the Wild Turkey is the largest of the North American game birds. It inhabits the sage-brush plains and table-lands of the western parts of the United States, feeding on the leaves of the sage-brush (*Artemisia*), berries, fruits, and occasional insects.

The two remaining genera of Grouse — one in North America and the other in the northern portions of the Old World — may be known at once from those previously mentioned by having the lower part of the tarsus naked. The former contains the Ruffed Grouse (*Bonasa*), which are further distinguished by a ruffed frill of broad, soft feathers on each side of the neck, and a tail composed of eighteen feathers, while the latter embraces the Hazel Hens (*Tetrastes*) that are without the frill on the sides of the neck and have a tail of sixteen feathers.

The **Ruffed Grouse** (*Bonasa umbellus*) is one of the best known and most highly prized of American game birds, and the single polymorphous species, which has been separated into four comparatively slight color forms, ranges over practically the whole of the wooded portions of North America, except at the far south. The Ruffed Grouse, known mainly in the Northern States as the Partridge, while in the South it is commonly called the Pheasant,

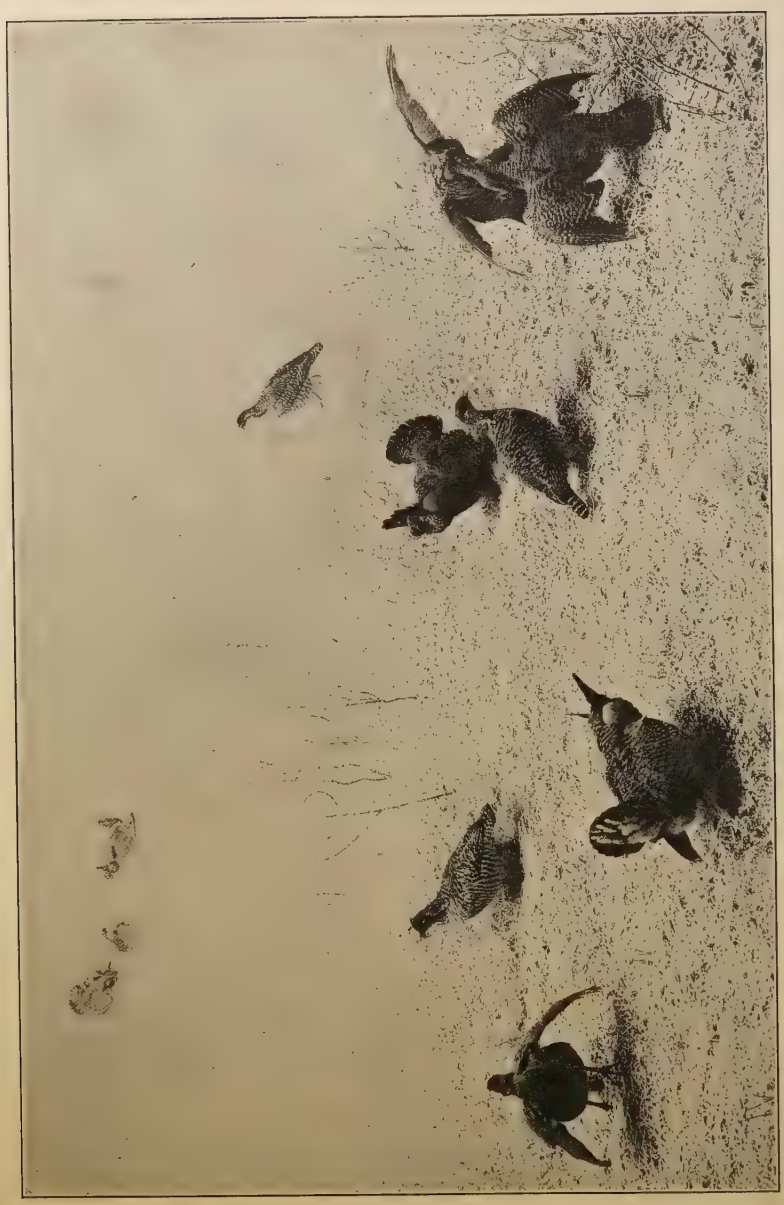


Fig. 96. — Courtship of Prairie Hens, *Tympanuchus americanus*. (Courtesy of the American Museum of Natural History.)

prefers undulating and hilly country, especially where it is well wooded and covered with "considerable undergrowth, interspersed here and there with cultivated fields and meadow lands." Naturally it is a rather tame and unsuspicious bird, and when suitably protected is not an uncommon visitor to the vicinity of human habitations, especially during winter, but the ceaseless persecution that is waged against it has perforce made it exceedingly shy and wary. Its flight, particularly as it launches forth, is sudden and noisy, but when well under way it flies with great strength and swiftness. On the approach of man it either seeks safety in rapid running, disappearing like a flash among the tangled weeds and underbrush which it frequents, or crouches motionless on the ground, with which its plumage so blends as to make it invisible; and many a would-be sportsman, threading his way noiselessly through the forest, has been so startled by the sudden rushing forms springing from under his feet as to forget the object of his coming until too late. In spite of the constant warfare of man, and the aggression of its wild enemies, the foxes, weasels, minks, and the voracious members of its own class, it manages to pretty well hold its own. An unusually severe winter or a particularly wet, cold spring may reduce the numbers, but a succeeding favorable season usually restores the equilibrium. They are generally resident and nesting wherever found, usually moving about but little. In the southern portions of its range, however, it frequents mostly the higher mountain slopes, but in fall or early winter often seeks the lower levels. The members of a covey, if undisturbed, usually keep together for some time after they are full grown, and have a low, sharp call note that can be heard for only a short distance. But one of the strongest characteristics of the Ruffed Grouse is the "drumming" of the male, a sound familiar to every woodland lover within its range. "This loud tattoo," says Thompson, "begins with the increased thump of a big drum, then gradually changes and dies away in the rumble of the kettle-drum. It may be briefly represented thus: *Thump — thump — thump — thump, thump; thump, thump-rup rup rup rup r-r-r-r-r-r-r-r-r.*" The manner in which the sound is produced has been speculated upon, but it is now definitely settled that it is by the rapid beating of the wings toward the body, and not against a log as commonly supposed. The actual procedure has been quite frequently described, but I venture to quote from Mr. W. C. Kendall, who observed one drumming in northern Maine in the fall of 1901. He says: "A bird was heard drumming. At first it was difficult to locate the source of the sound. He was crouching or sitting crosswise of an old log, his head drawn down as if asleep.

FIG. 97. — Hazel Grouse, *Tetrastes bonasia.*

When about to drum, he would straighten up without really standing up, much as a duck flapping his wings while sitting on the water. Beginning with slow, short, interrupted strokes he would beat against his sides, or the air, faster and faster, finally, still fast but with less force, causing the sound to die out in a sort of whirr, when he would resume his former position. The drumming occurred at intervals of six to ten minutes. He did not 'strut up and down the log,' nor did he strike the log with his wings; he did not even stand up. It seemed to me that the sound was caused by the air being forced between the wings and the body by the short, quick strokes." The drumming is mostly in the spring, its object being to attract the female, but occasionally throughout the summer and fall the long roll may be heard in the forest. By some the Ruffed Grouse is considered to be polygamous, but this is doubted by Bendire and other equally good authorities, and all that can be said at present is that it may be, but the case is not proven. The nest, a mere depression in the ground, is placed in a great variety of situations, such as alongside a stump, fallen tree, or rock, or among tangled vegetation, in a brush pile, or occasionally in a more open and unexpected place. The nest is scantily lined with a few leaves, grasses, or pine needles, and the complement of eggs varies from eight to fourteen, rarely more. In color they are pale ochraceous-buff, about half of them being more or less minutely spotted. When flushed from the nest, the female is often successful in decoying the intruder to a distance by feigning lameness or a broken wing, so that a fox, for example, may be led on, thinking his prey is just within his grasp, until he is a quarter of a mile or more from the nest, when the bird takes wing and is gone like a flash. The young run about within a few hours after they are hatched, and can fly for short distances at the end of a week. They are fed at first mainly on insects, but soon berries, fruits, and grain are added, and this varied list represents their food until winter, when they subsist largely on catkins, buds, and leaves. Often when the ground is covered with snow the birds drop into a soft bank and burrow under for a short distance, where they spend the night in comparative warmth, though the freezing of the snow into a crust above them may sometimes turn the shelter into a tomb.

The **Hazel Hens** (*Tetrastes*), of which four forms are recognized, are smaller birds than the Ruffed Grouse, none of them exceeding fourteen inches in length, and, as already stated, they are without the frilled ruff on the sides of the neck. The best-known species is the common Hazel Hen, Hazel Grouse, or "Gelinotte" (*T. bonasia*), a handsome bird of Europe and northern Asia. The male is grayish or rufous, barred with black above, while the chin, throat, and breast are black, the latter margined with white. The female is similar but smaller and has the chin and throat mostly white. According to Von Wright there is a tradition among the Finns that, " at creation, this bird was the largest of the feathered tribe, but that year after year it has decreased in size, and will continue to do so until at last it will become so very diminutive as to be able to fly through the eye of a needle; and when that happens the world will come to an end." The Hazel Hens frequent the "lower pine forests, birch-woods and hazel-copes," but appear to enjoy a local rather than a general distribution. Their flight,

like that of the Ruffed Grouse, is noisy and rapid, though not far extended, and when disturbed they take refuge among the thickest leafy branches of a tree. The male does not appear to "drum" after the manner of its relative, but utters, as his call to the opposite sex, a sort of melancholy long-drawn whistle, which in Scandinavia is often imitated by means of a hollow pipe of bone, wood, or metal, and the bird lured within shooting distance. The nest is a slight depression scratched in the ground, and the eggs, some eight to twelve in number, are buff spotted with brown. Of the habits of the Gray-bellied Hazel Hen (*T. griseiventris*) of eastern Russia, little or nothing is known, and the same may almost be said of Severtzov's Hazel Hen (*T. severtzovi*) of western China.

American Partridges and Quails (*Odontophorinæ*). — The second of the minor groups into which the subfamily *Tetraoninæ* may be separated is characterized by having the tarsi and nostrils entirely naked, as well as by the absence of pectinations on the sides of the toes and the generally smaller size. Among themselves they are also divisible into two groups, in the first of which, including the American Partridges and Quails (*Odontophorinæ*), the cutting edge of the lower mandible is more or less serrated, while in the other (*Perdicinæ*), which embraces the Old World Partridges, Francolins, and Quails, the lower mandible is without the serrations. The latter group, as will be shown later, exhibits more or less of a transition to the Pheasants, and by some is even placed with them in the subfamily *Phasianinæ*.

Wood Grouse. — Before passing to the more important members of this group we may mention briefly the Wood Grouse, or Long-tailed Partridges (*Dendrortyx*), of which some six or seven forms are known, ranging through Mexico to Costa Rica. They are large birds for the group, some of them reaching a length of fifteen inches, and may be known at once by having the tail as long or nearly as long as the wing, the middle pair of feathers being much longer than the outer pair. They are plain-colored birds, the sexes being practically similar, and without a very conspicuous crest. They frequent the high forest-clad mountains, keeping much in the vicinity of the dense forests, and are described as being very shy and difficult of approach.

Scaled Partridges. — In all the remaining members of this group the tail is decidedly shorter than the wing, although in the first genus to be considered (*Callipepla*) it is rather more than two thirds the length of the wing. This genus is further distinguished by having a tail of fourteen feathers, a small and weak bill, and a short crest which does not extend much beyond the feathers of the head. This includes the Scaled Partridges, of which only two forms are distinguished, although it was formerly made to include several forms now accorded generic rank. They are rather handsome little birds, ten or twelve inches long, light brownish or grayish above, with the hind neck, upper back, chest, and sides bluish gray, each feather edged with black, thus producing a scaled appearance. The remainder of the under parts are buffy with white streaks along the flanks, and the crest is also tipped with white. The Scaled Partridge, Blue Quail, or White Top-knot Quail (*C. squamata*), as it is variously called, is a constant resident in northwestern Mexico and the contiguous border

of the United States, from the high plateaus and table-lands having an elevation of between 1500 and some 7000 feet, between the principal water courses. "These barren and rocky foot-hills and table-lands are covered in places with a dry, harsh vegetation consisting of different species of cacti, stunted yuccas, catclaw-mimosa, creosote, and dwarf sage-bushes, where the soil is so parched that scarcely anything else will flourish, and where nearly every shrub is covered with sharp spines or thorns; such places I found to be the favorite home of the Scaled Partridge." — BENDIRE. I have myself observed them in somewhat similar situations below Santa Fé, New Mexico. Although frequently found miles from water, they are said to make daily visits, usually late in the afternoon, to the drinking places. During the summer they go about in family parties, but toward fall two or three such parties may unite and occasionally as many as sixty or eighty are seen in a covey. When flushed they scatter and fly for short distances, and then alight and run among the bushes with great swiftness, rarely taking wing unless closely pushed. The nesting season begins about May 1, and two or three broods are sometimes raised in a season. The nest, always on the ground, is placed in a great variety of situations, such as rocky hillsides, alfalfa meadows, corn and grain fields, and not rarely in open barren flats. The number of eggs ranges from nine to sixteen, the usual number being eleven or twelve. In color they vary from creamy white to pale buff, often thickly spotted with brown. The Scaled Partridge feeds on seeds, berries, grain, tender buds, as well as insects of various kinds, and is esteemed for food, immense numbers often being trapped, and sold in the cities of New Mexico and Arizona. Another well-marked species (*C. castanogastris*) is found in eastern Mexico and the lower Rio Grande Valley in Texas. It differs from the typical form in having a large patch of rusty chestnut on the abdomen.

Plumed or Mountain Partridges. — Characterized by a tail of twelve feathers and a conspicuous crest of long black feathers are the Plumed or Mountain Partridges (*Oreortyx*), of which two or three well-marked forms are known, all of the extreme Western States. They are handsome birds, ten and a half to eleven and a half inches long, plain brown or olive above, and bluish gray and chestnut below, with the throat and fore neck margined by a white band, and the flanks barred with black and white; the females are similar except that the crest is usually smaller. The Mountain Partridge, or Mountain Quail (*O. pictus*), is found in the Pacific coast districts from Santa Barbara, California, to Washington, being confined to the moist mountainous regions where the rainfall is very heavy. In the dryer interior it is replaced by a lighter colored race, the Plumed Partridge (*O. p. plumiferus*), which occurs on both sides of the Sierra Nevada from Oregon southward. Both are resident and breeding wherever found, the latter, according to Bendire, being "essentially a bird of the mountains, where it is more partial to the open pine forests and rocky ridges, covered with chaparral and undergrowth, than to the densely timbered portions of the ranges. They are shy birds, preferring to escape by running rather than by taking wing, although they can fly swiftly if they will." The call note of the male is a clear whistle, like "*whu-ie-whu-ie*," usually uttered from an old

stump, the top of a rock, or a bush; "but when alarmed, a note like '*quit quit*' is used." The nesting season begins early, and in the lower foot-hills two broods are often reared, but higher up in the mountains only one. The nest is concealed under a fallen tree-top, by the side of a log, or in tangled weeds and grass, and the eggs are sometimes as many as twenty, but usually only twelve or fifteen.

California Quail and Relatives. — Another and larger genus of crested Quails is *Lophortyx*, the six or seven forms of which are distributed from Washington through Oregon, California, and well into western Mexico. The sexes, unlike the last genus, are very different in coloration. The beautiful California Quail (*L. californicus*) is one of the handsomest and best known of the Pacific coast game birds. About nine and a half inches long, the male has the crest and throat black, the latter with white margins, the mantle olive-brown, chest and tail gray, and the abdomen with black scale-like markings, and a central spot of chestnut, while the flanks are olive-brown, with white streaks. The female, on the other hand, has the head without the black and white markings, the prevailing color being smoky brownish, and the abdomen lacks the chestnut patch. "Their favorite haunts," says Bendire, "are the undergrowth and thickets along water courses, brush-covered side hills and canyons, frequenting the roads, cultivated fields, vineyards, and edges of clearings to feed. It is a constant resident, and breeds wherever found." When not molested, they become very tame, almost domesticated, coming frequently to the vicinity of dwellings, and nesting and rearing the young among the shrubbery near by, but as with other birds, constant persecution has made them shyer. Formerly it is said to have been a not uncommon sight to see flocks of five hundred or more together, but in late years coveys of fifty are as large as it is usual to find. It is a pleasing sight to see them running about among the shrubbery or scurrying into the hedgerows from a dust bath in the road. Their nest is a very slight affair, being simply a hollow scratched in the ground at the base of a stump, in a pile of brush, or a thicket of grass and weeds, and occasionally the eggs may be placed in a hen's nest in the chicken house. From twelve to sixteen creamy white, spotted or blotched eggs constitute a set. A paler, grayer colored race, known as the Valley Partridge (*L. c. vallicola*), is found in the interior districts of California and Oregon, ranging south through the peninsula to Lower California, where it often occurs in great numbers. Similar to these but with the flanks chestnut streaked with white, and the abdomen with a central black patch, but without the scale-like markings, is the Gambel's Partridge (*L. gambeli*)

Fig. 98. — California Quail, *Lophortyx californicus*.

which ranges from northwestern Mexico through western Texas to southeastern California and Nevada. It frequents much the same sort of country as does the Scaled Partridge and in many localities is found with it. It is in many places a very abundant species, and is one of the few game birds that has apparently increased since the advent of civilization, in fact it is said to have become a nuisance to farmers in the vicinity of the Salt and Gila rivers, Arizona. A subspecies of this, known as the Buff-breasted Partridge (*L. g. fulvipectus*), has been recently described from southwestern Sonora. It differs mainly from Gambel's Partridge in its generally darker and more intense colors and larger bill. In western Mexico occurs another species, the Elegant Partridge (*L. elegans*), which may be known by having the crest pale rufous and the throat white spotted with black; and in southeastern Mexico are two little species only about seven and a half inches in length, which have been referred to a distinct though very closely related genus (*Philortyx*). They have the tail shorter than any of the others just mentioned, and the sexes are similar in plumage, this being much banded with black and white or dusky and whitish. In the Banded Partridge (*P. fasciatus*) the cheeks, chin, and throat are white and the bill black, while in the Black-faced Partridge (*P. personatus*) these areas are black and the bill brownish.

Crested Quails. — In various of the Central American states as well as on near-lying islands are the Crested Quails (*Eupsychortyx*), a genus of some eight or nine handsome little birds with very distinctly crested heads. Of the recently described Margaritan species (*E. pallidus*) from Margarita Island, Lieutenant Robinson says: "These handsome birds were abundant near the coast, but none were seen in the interior of the island. They ran through the cactus undergrowth with indescribable swiftness, and it was a difficult matter to cause them to take wing. The call of the males is identical with that of our common Bob-white, and the call of the scattered members of a covey is also the same."

Bob-white. — Undoubtedly the most abundantly distributed and generally well-known American game bird is the Bob-white, the typical form of which is widely dispersed over the United States east of the Mississippi and Missouri rivers, from the Gulf States to southern New England, Minnesota, Nebraska, and Texas, and is said to be gradually extending its range toward the west. It has also been introduced in many places, notably in the vicinity of Denver, Colorado, where I have heard them calling as familiarly as in their eastern home. It is also abundant as an introduced bird in the Great Salt Lake Valley of Utah, near Boise City, Idaho, the Willamette Valley, Oregon, and various islands in Puget Sound and other places, taking kindly to new surroundings provided climate and food are congenial. The genus (*Colinus*) to which the Bob-white belongs, with its fifteen or more species and subspecies, enjoys a practically unbroken continuity of range, in addition to that above outlined, from Florida along the Gulf States to the Rio Grande, and thence south through eastern Mexico to Tabasco and over the Isthmus of Tehuantepec to and down the Pacific coast to the borders of Guatemala. A large series of specimens obtained throughout this range seems to show that many of the forms are only subspecies of the

common Bob-white of the eastern United States, merging by gradual changes from one to another, but the evidence is somewhat conflicting on several points and must await further elucidation. In any event they are Bob-whites and have practically the same familiar whistled call throughout.

The Bob-white *par excellence* (*Colinus virginianus*), or Partridge, as it is commonly called in the South, is a bird with the lower breast and abdomen white or buff, barred with black, while in the male the throat and band over the eye are white, and a crown together with a band from beneath the bill to the eye, and a band on the upper breast are black. Bob whites are sociable birds, although never going in very large flocks, and may be heard calling in low tones to each other. They prefer rather open country, such as fields and pastures where there are small bodies of woodland, brush and brier patches and rank-growing vegetation. Naturally they are quite tame and unsuspicious, but the continual warfare of gunners has made them cautious. They cling closely to cover, from which it is difficult to flush them without the services of a trained dog, although they fly strongly when once up. If unmolested, they go about in family parties, wandering but little from their birthplace until spring, when they break up into pairs and begin the duties of rearing the young. The male is fearless at this season and may be heard whistling the familiar "*Bob-white*," "*Ah, Bob-white*," from a fence post or other point of vantage, while the female is shy and but little in evidence. The nest is a simple affair, placed on the ground in a tussock of grass, a brier patch, or in a field or garden, and is usually provided with a natural archway of vines or other vegetation, but occasionally an artificial dome is constructed over it. In the northern part of the range, where they rear but a single brood, the clutch of eggs may number twenty-five or thirty; but in the South, where they raise two or even three broods, the number does not usually exceed fifteen. The male apparently takes little part in incubating the eggs, although he assists in caring for the young, taking full charge of the first brood while the female is hatching the second. They feed on grain of various kinds, seeds, berries, wild grapes, and insects, and in the fall often eat acorns, beechnuts, etc. In Florida there is a smaller, darker race, the Florida Bob-white (*C. v. floridanus*), which is common throughout the pine-covered areas; and in Texas and northeastern Mexico occurs another race (*C. v. texanus*) that is more olive-grayish above and has usually a distinct band of pale cinnamon across the chest below the black band. To quite a distinct group apparently belong certain Mexican and Central American forms, in which the lower parts are uniform cinnamon or cinnamon-rufous. Thus in Grayson's Bob-white (*C. graysoni*) of southwestern Mexico, the throat and a stripe over the eye are white, while in the Masked Bob-white (*C. ridgwayi*) and others the throat is black, and the white superciliary stripe much reduced or obsolete.

Massena Partridge. — Of the remaining genera but one (*Cyrtonyx*) is represented in the United States, and this by a single subspecies, the Massena Partridge (*C. montezumæ mearnsi*), which ranges from western Texas, New Mexico, and Arizona south into Mexico. The members of this genus, some five in

number, have the tail much less than half the length of the wing, the feathers being soft and hardly to be distinguished from the coverts, while the claws are very large and broad, and the head provided with a full, soft crest of blended feathers. They are handsome birds, the sides of the head and neck showing a distinct black and white pattern and the breast and sides beautifully ocellated with white or buff. The Massena Partridge, which is known in western Texas as the Black or Black-billed Quail and in Arizona as the "Fool" Quail, is a resident of the mountainous districts within its range, although often coming to lower altitudes in winter. They are exceedingly tame and confiding in many parts of the habitat, often remaining crouched on the ground within a few feet of the intruder, or when flushed flying for a short distance and stupidly attempting to hide in the most conspicuous places, where they are often killed with stones. With the advent of civilization they have readily adapted themselves to the change, and may frequently be seen about the ranches feeding on grain. Of their habits in New Mexico, Mr. E. W. Nelson says they "were commonly found dusting themselves in the roads, and usually stood and watched our approach until we were within a few yards, and then flew into the bordering thicket and laid very close. When a covey was surprised among the grass, they arose at our feet and scattered in every direction, but never went very far, and while flying off would utter low notes of alarm, sounding like '*chuk-chuk-chuk.*'" The nest is usually carefully concealed in a bunch of grass or under a low bush that is reached by a narrow entrance or tunnel. The pure white eggs are ten or twelve in number. The other species, such as the Ocellated Partridge (*C. ocellatus*), Salle's and Merriam's Partridges (*C. sallæi* and *C. merriami*), are found in various portions of Mexico; but little is known of their habits.

Of the **Long-clawed Partridges** (*Dactylortyx*) of Mexico and Central America we may only mention one of the four known species. This bird (*D. thoracicus*), found from southern Mexico to Yucatan, Guatemala, and Salvador, is about nine inches long, and has the mantle and crown reddish brown mixed with black, the lower back and rump olive-brown, while the throat, cheeks, and stripes through the eyebrows are reddish chestnut and the lower parts are grayish; there is also a black patch on the sides of the throat. Of the habits of this species G. F. Gaumer writes as follows: "This bird is common in all the eastern forests of Yucatan, where it is much esteemed for its fine flesh and as a household pet. As a pet it is not a success, living but a few months in confinement. Like the Quails, this bird lives upon the ground, where it is always seen in pairs. At nightfall it sings a very pretty song, beginning with a low whistle, which is three times repeated, each time with greater force; then follow the syllables *che-va-lieu-a* repeated from three to six times in succession. The tone is musical, half sad, half persuasive, beginning somewhat cheerfully, and ending more coaxingly. From its color and its habit of remaining immovable while one is passing, this bird is somewhat difficult to see. I have frequently seen it squatting close to the ground while I passed within a few feet of it. It seldom flies, and never flies far when compelled to take wing."

Thick-billed Partridges. — Very closely related are the so-called Thick-

billed Partridges (*Odontophorus*), of which nearly twenty species are known, mainly of Central America and northern South America, with a few extending into southern Mexico. Several are so rare that but one sex is known, and as might be supposed, but little has been ascertained regarding their habits.

The **Old World Partridges, Francolins,** and **Quails** (*Perdicinæ*) constitute a large group of some twenty five genera and one hundred and fifty species. As already pointed out, they differ quite sharply from the American Partridges and Quails in the absence of serrations on the cutting edge of the lower mandible; but on the other hand, the line between them and the Pheasants is at best only an artificial one, since such forms as the Bamboo Partridges (*Bambusicola*), the Indian Spur Fowl (*Galloperdix*), the African Spur Fowl (*Ptilopachys*), etc., present undoubted gradations that make it difficult to decide where they belong. Although acknowledged to be a somewhat artificial character, the shape of the wing is mostly relied upon to separate them, having the first quill equal to or longer than the tenth in the *Perdicinæ*, and generally much shorter than the tenth in the Pheasants; but there are some exceptions to both and the length of the tail is introduced as a deciding factor, this being short in the first group and more or less elongated in the second.

Snow Partridges, Pheasant-Grouse, and Snow Cocks. — The first of these that we may consider are the Snow Partridges and Snow Cocks of western Asia. In the Snow Partridge (*Lerwa lerwa*), which is about fourteen inches long, the sexes are similar in plumage, being black narrowly barred with whitish above, and mostly rich chestnut below, while the bill and feet are red. They are found in the higher ranges of the Himalayas and some portions of China, frequenting the more rugged, rocky portions at elevations between 10,000 and 15,000 feet, remaining near the snow in summer, but coming somewhat lower in winter or after severe snowstorms. They appear to be very tame and are reluctant to take wing, and when doing so only fly for short distances. They feed, it is said, on moss, grasses, and seeds, and are highly esteemed for their flesh although not often shot, "as those sportsmen who traverse its lonely haunts are generally in search of larger game." But little is known of their nesting habits beyond the fact that the eggs are large and "dull white, freckled all over with reddish brown." Closely allied but differing in larger size and in having a tail of eighteen instead of fourteen feathers, and the feathering on the tarsi scarcely extending below the joint, are the so-called Pheasant-Grouse (*Tetraophasis*), of which only two species are known, both confined to the higher parts of the mountains of Tibet and western China. They are seventeen or eighteen inches long, mostly dull olive-brown above, and gray spotted with black below. They are very rare, at least in collections, and but little is known of their habits. Very much larger than these, in fact the largest of the group, are the great Snow Cocks (*Tetraogallus*), of which eight species are now recognized, all of the higher mountains of Asia, from Asia Minor and the Caucasus to western China, the Altai Mountains, and the Himalayas. They inhabit such generally inaccessible places, often at elevations between 15,000 and 19,000 feet, that comparatively little is known of their habits. Of the several

species we may mention the Himalayan Snow Cock (*T. himalayensis*), or Jermoonal, as it is known by certain of the native tribes where it dwells. It is a striking bird, over twenty-five inches in length, gray and buff above and dark gray below, with the throat and upper breast white separated by a chestnut band, the breast white-barred, and it is further marked by a distinct patch of chestnut on the sides of the nape. It occurs in the higher ranges of the Himalayas and the Altai Mountains, being, according to Wilson, "confined exclusively to the snowy ranges, or the large spurs jutting from them, which are elevated above the limits of the forest, but is driven by the snows of winter to perform one, and in some places two, annual migrations to the middle regions; in summer they are only seen near the limits of vegetation." It is further gathered from Wilson that the Snow Cock is gregarious, congregating in packs sometimes to the number of twenty or thirty, but, in general, not more than from five to ten. They never enter the forests or jungle and even avoid spots where the grass is long and where there is underwood of any kind. "When feeding, they would walk slowly uphill, picking the tender blades of grass and young shoots of plants, occasionally stopping to scratch up a certain bulbous root, of which they seem very fond. When walking they erect their tails, have a rather ungainly gait, and at a little distance have something the appearance of a large Gray Goose." The nest is a slight depression in the ground near a rock or bush, and the eggs, from five to nine or even eleven in number, are olive or brownish, spotted and dotted with reddish.

Red-legged Partridges. — Quite different are the Red-legged Partridges (*Caccabis*), which to the number of eight or nine species range from western and southern Europe to eastern Asia. They may be known by their small size, which varies between twelve and sixteen inches, by the tail of fourteen feathers, and more particularly by having the sides and flanks transversely barred, in sharp contrast to the remainder of the lower plumage. One of the best-known is the common Red-legged or French Partridge (*C. rufa*) of central and southern Europe and the Canaries, where it is possibly introduced, as it was a century or more ago in England. They frequent especially the edges of fields, hedgerows, and grassy places, running with extreme rapidity and almost refusing to be flushed; but when they do rise, they fly straight and rapidly, and thus afford good sport. As is often the case among game birds, they are extremely pugnacious during the breeding season, fighting with other species as well as among themselves. The nest is the usual slight hollow scratched in the ground, and the eggs are from ten to eighteen in number.

Francolins. — Passing over the little Seesee Partridges (*Ammoperdix*), the three species of which are known from the last by their smaller size and twelve-feathered tail, we come to the large genus of Francolins (*Francolinus*), of which there are upwards of fifty forms, ranging over southern Europe and Asia and the whole of Africa, being most abundant in the latter country. They have a tail of fourteen feathers which is half, or a little more than half, the length of the wing, while the feet are with or without one or more pairs of spurs; the sexes are usually similar in plumage, though in a few it is quite different. As it will be

quite impossible to mention all of the many of the Francolins, we may select the type species (*F. francolinus*) which is found in Cyprus, Palestine, Asia Minor, and thence through Persia to India. It is about thirteen inches long, the male having the upper back black spotted with white, the lower back barred with white, and the under parts black spotted along the sides with white, while the throat is deep black and the neck encircled with a wide band of

Fig. 99. — Common Francolin, *Francolinus francolinus.*

dark chestnut; the female is paler and duller. This pretty little species, also called the Black Partridge, is found in grassy places and cultivated ground, where it feeds on grain, seeds, and insects. It runs well on the ground and when flushed affords excellent sport; but as it is far from a prolific breeder, it has been exterminated in parts of its range and much reduced in others by excessive shooting. It lays from six to ten brownish buff eggs in a well-concealed nest. The Indian natives often keep it as a cage bird, as it soon becomes perfectly tame, often using it as a lure for trapping wild birds.

Closely related to the last are the Bare-throated Francolins (*Pternistes*) of east and south Africa, which do not differ essentially except in possessing a naked throat and a large naked patch around the eye, while the Long-billed Francolins (*Rhizothera*) differ in having only twelve tail-feathers and a long, curved bill; the two species of the latter range from the southern part of the Malay Peninsula to Sumatra and Borneo.

True Partridges. — The true Partridges (*Perdix*) of the Old World are known from the preceding genera by possessing sixteen or eighteen feathers in the tail, feet without spurs, and a similar or nearly similar plumage for both sexes. The Common Partridge (*P. perdix*) of Europe and central Asia is about twelve inches long, the plumage being gray and reddish brown, the male, and exceptionally the female, with a horseshoe-shaped patch of chestnut on the lower breast. This is a favorite bird among all lovers of birds and seems to be aided rather than limited by extending civilization. It avoids woodlands and frequents especially open, cultivated grounds or heaths and commons, going about, except during the nesting season, in coveys of from half a dozen to twenty or more, and is a favorite game bird throughout its range. Rarely if ever perching in trees, it spends its whole time on the ground, though when pushed rises with a loud whirring sound and enjoys a strong, straight flight. The nest is usually well concealed under a tuft of long grass or a bush, and contains from ten to fifteen, or even as many as twenty, pale olive-brown eggs. This species appears to break up into a number of geographic races, of which the so-called Migratory Partridge (*P. p. damascena*) of the Alpine regions of western Europe is an example. This form is much smaller than the species and has the bill and feet yellowish instead of horn-gray; it comes down to the plains of southern and central Europe in winter.

Bush Quails. — Quite distinct are the little Bush Quails of the Indian peninsula and adjacent regions, none of which exceeds seven inches in length; they number five species disposed in two genera. The Jungle Bush Quail (*Perdicula asiatica*) is brown above, and white barred with black beneath, the throat and forehead being rufous-chestnut. Mr. Hume tells us that "moderately thick forests and jungles, hills, ravines, and broken ground, not too deficient in cover, and rich cultivation, if not in too damp and undrained situations, from near the sea-level to an elevation of four to five thousand feet, are the ordinary resorts of the Jungle Bush Quail." They are usually found in coveys of from eight to a dozen and permit themselves to be almost trodden on before rising, which they do with a piping whistle and in an instant spread to all points of the compass. They lay from five to seven creamy or brownish white eggs in a rudely made nest of fine grass and rootlets.

The **Tree Partridges** (*Arboricola*), so named from their affecting more or less dense forests and often perching on trees, are natives of southern Asia and adjacent islands, being distinguished among other things by a tail of fourteen feathers which is less than half the length of the wing. Of these the Common Tree Partridge (*A. torqueola*) occurs in the outer ranges of the Himalayas, at altitudes varying from 5,000 to 14,000 feet, where, according to Mr. Wilson, "it is most

numerous on the lower ranges in the wooded ravines and hillsides, inhabiting forests and jungles and never open spots or cultivated fields. It is rather solitary in its habits, generally found in pairs, but occasionally in autumn and winter five or six will collect together and keep to one spot. It is a quiet, unsuspicious bird; when alarmed it utters a soft whistle, and generally creeps away through the underwood, if not closely pressed, in preference to rising. It feeds on leaves, roots, maggots, seeds, and berries, and in confinement will eat grain. In the forests of the interior in spring it is often heard calling at all hours of the day, the call being a loud, soft whistle, which may be easily imitated so as to entice the bird quite close." Its eggs are said to be pure white. About twelve inches long, the male is olive-brown, barred with black above, face and throat black, fore neck white, as are the under parts, while the crown is bright chestnut; the female has the crown brown and the face, throat, and neck rusty, spotted with black.

Migratory Quail. — With the widely known Migratory Quail (*Coturnix coturnix*) we must close our account of this interesting group, although nearly every member is really worthy of extended mention. Hardly exceeding seven inches in length, this handsome little Quail is sandy-brown above variegated with black and straw color, the head "mottled with black and reddish brown, with three longitudinal, yellowish streaks," the chin and throat white with an anchor-shaped patch of black down the middle, and the lower parts reddish brown. As its name indicates, it is strictly migratory, spending the summer months or from March and April to September and October in Europe and northern Asia, and the remainder of the year in the Indian peninsula and South Africa. It is indeed remarkable, as Mr. Hudson says, that while in summer "he is a dweller on the ground, an earth lover, like his stay at home relation, the Partridge, yet in his wide wanderings he crosses seas, vast deserts, and the loftiest mountain chains, and by means of this migratory instinct has diffused himself over the three great continents." Although quite widely diffused throughout Great Britain, they are nowhere abundant, and being monogamous, are spread in pairs in suitable locations, preferring rough grass country rather than cultivated land. Soon after their arrival in spring — a very few may remain over winter — the call of the male is heard, "a shrill, piping note of three syllables, supposed to resemble the words *wet my lips* or *wet my feet*, according to the hearer's fancy." They breed on the ground, making a very slight nest with little or no lining, and lay from nine to fifteen eggs which are creamy white or buff, blotched and spotted with rich brown; one or often two broods are reared each season. After the nesting season is over they lay aside their exclusiveness and congregate in vast flocks for the migration, and in portions of their winter range, notably in India, they occur in numbers almost incredible. Thus Tickell says of them on an island in the Ganges: "I do not exaggerate when I say they are like locusts in number. Every step that brushed the covert sent off a number of them, so that I had to stand every now and then like a statue and employ my arms only, and that in a stealthy manner, for the purpose of loading and firing. A furtive scratch of the head, or a wipe of the heated brow, dismissed a whole 'bevy' into the next field."

They are highly esteemed for food, and during the migrations, particularly in fall, they are netted by thousands for market. This species has on several occasions been introduced into the United States, but has not thus far been established, as it probably migrates out into the Atlantic and becomes lost.

The Pheasants, Fowls, and Peacocks (Subfamily *Phasianinæ*). —The Pheasants as here restricted comprise over twenty genera and upwards of one hundred species of for the most part large and elegantly plumaged birds. As already pointed out, the present group is not at all sharply differentiated from the last; indeed, many authorities unite the so-called *Perdicinæ* directly with the *Phasianinæ*, but it seems as well to keep them separate. As offering in some respects a transition between the two groups, mention may be made of the little Pheasant-Quail (*Ophrysia superciliosa*), a rare species of the northwestern portions of India. In size it agrees closely with the Common Quail (*Coturnix*), being among the smallest of the group, but has the long, soft plumage of the Blood Pheasants, and is doubtless most nearly related to them. In addition it has a relatively long, wedge-shaped tail of only ten feathers and a different plumage in the two sexes, the male being largely gray with the feathers edged with black, while the sides of the head, throat, and chin are black with white bands; the female is mostly brown with black shaft-stripes, and has a black band on either side of the crown and a whitish throat. This is still one of the rarest Indian birds, being generally met with in small coveys of from six to ten birds, and clinging persistently to the long grass cover, where their presence might be unsuspected but for their soft Quail-like notes; they feed entirely upon seeds of grasses. Their nests and eggs appear unknown.

The **Blood Pheasants** (*Ithaginis*) are much larger, attaining a length of from fifteen to nearly eighteen inches, the three known species being confined to Tibet and western China. The plumage, the prevailing color of which in the males is a peculiar grass-green, is long and soft, and the male is provided with a full crest and has the body-feathers pointed. The male has the feet armed with two or more pairs of spurs, which are represented by a pair of blunt knobs in the female. In the best-known species (*I. cruentus*) of the higher Himalayas and Tibet, the male is gray above with the wings more or less green, as are the lower parts, the chin, throat, cheeks, and entire tail-coverts being crimson, and the feathers of the breast edged with the same. The female, which is much smaller than the male, is pale brown above and reddish brown below, mottled throughout with darker; in both the naked skin around the eyes and the feet are coral-red. They are found at elevations of from 10,000 to 14,000 feet, frequenting especially the forests of pine and juniper, upon the berries and seeds of which they largely feed during the winter, but at other seasons on wild fruit, seeds, grass, and insects. They are fearless and rather stupid birds, enjoying but feeble powers of flight, usually preferring to escape by running rather than take to wing. They are found in coveys of twenty or thirty or in winter often in great flocks, and if they become separated, as when hunted, begin at once calling sharply to bring the scattered members together. After feeding on berries and fruits they are considered good eating, but in winter the flesh acquires a strong flavor of juniper

and pine, and is only resorted to when other things fail. They nest on the ground under bushes and grass, laying ten or twelve eggs. The other species, so far as known, have similar habits.

The **Horned Pheasants**, or **Tragopans** (*Tragopan*), often misnamed Argus Pheasants, are large and magnificent birds, perhaps unsurpassed by any other members of the group in the beauty and perfect harmony of coloration. With the sides of the head nearly or quite naked, the males are provided with a short crest, an erectile, fleshy horn inserted just above each eye, and a large, brightly colored, apron-like wattle on the throat, which, during the breeding season hangs down for several inches, but becomes scarcely visible in winter. The five known species occur in the higher wooded mountains of northern India and China, the handsomest and best-known being the Crimson Tragopan (*T. satyra*). Attaining a length of twenty-six inches, of which the tail makes up nearly ten inches, the male, to quote from Mr. Ogilvie-Grant, has the crown and sides of the head black; the sides of the crown and longer crest feathers, mantle and under parts orange-carmine, and the remainder of the upper parts olive-brown, each feather near the tip with a rounded spot of white, edged with black, while the wing-coverts are edged with orange-carmine, the tail black, barred with buff, the horns greenish blue, and the throat wattle orange or salmon-color, with blue cross-bars. The female, which is only about twenty inches long, is black above, mottled and spotted with buff, the chin and throat whitish and sandy buff beneath, finely mottled with black and whitish shaft-spots. The Crimson Tragopan is essentially a forest bird, frequenting the densely wooded ranges of the Himalayas up to 12,000 feet in summer, and even in winter rarely coming below 7000 feet. Although liking a situation near the snow, it never comes out upon it, but confines itself to the dense jungle, which it hardly ever voluntarily quits. "Except by chance," says Hume, "when you may come upon a male sunning himself or preening his feathers on some projecting rock or bare trunk of a fallen tree, these birds are never seen, unless by aid of three or four good dogs, who will speedily rouse them up, or of a trained shikari, who will call them out by closely imitating their loud bleating cry. If you ever catch a passing glimpse of them, it is but for a second, as they drop like stones from their perch and dart away with incredible swiftness, always running, *never*, so far as I have seen, rising unless you accidentally almost walk on them." They appear to feed upon insects, leaves, shoots of the bamboo, wild fruits, and seeds, and to make their nests in dense patches of hill bamboo; the eggs are as large as large fowls' eggs, white, slightly speckled with dull lilac. These birds are usually taken by snaring, the natives building two long, converging lines of hedge, and in openings near the point nooses are placed, the birds being slowly driven within the lines.

Moonals. — Of about the same size but even more gorgeous in plumage are the splendid Moonals (*Lophophorus*), the males of which have much of the upper surface resplendent with glittering metallic green, blue, purple, and orange-crimson, in addition to which the head is adorned with a peculiar crest of about a dozen feathers some three inches in length, each with a bare shaft and a spade-shaped enlargement at the tip; the females are much plainer, being blackish

with buff centers to the feathers and irregular bars and mottlings. The five species are found in the elevated forest regions of the vast Himalayas, occupying much the same situations as the Tragopans, though in addition to the forests it is essential that there be plenty of succulent under vegetation, which serves the double purpose of supplying food and the necessary concealment. The Common Moonal (*L. impeyanus*) ranges from eastern Afghanistan to western Bhutan, and in suitable situations is an abundant species, frequenting especially the great ridges jutting from the snow, and where in morning and evening, when they

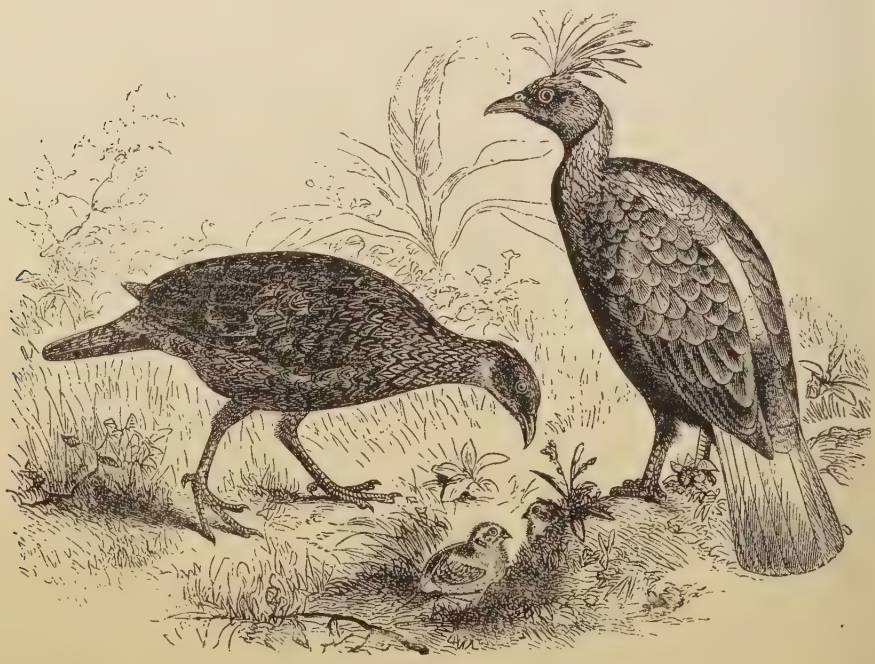


FIG. 100. — Moonal, *Lophophorus impeyanus*.

come out to feed, they may be seen in the open glades of the forest and on the green slopes above. In autumn, after the rank vegetation has been killed by the frost, they begin to collect together, and it is — or once was — not uncommon to find hundreds in a day's walk. They then resort to those parts of the forest where the ground is thickly covered with fallen and decaying leaves, under which they search for grubs and other insects, descending lower and lower as winter sets in, and the surface becomes frozen or covered with snow. It seems doubtful if they pair at all, or if they do, the union is soon dissolved, for after the hen begins to sit the male pays no further attention to her, nor does he assist in the care of the young, and during the remainder of the year flocks are often found that are made up of birds of one sex only. Ordinarily the Moonal roosts in the high

forests trees or in summer occasionally on the ground, and, says Hume: "There are few sights more striking, where birds are concerned, than that of a grand old cock shooting out horizontally from the hillside just below one, glittering and flashing in the golden sunlight, a gigantic rainbow-tinted gem, and then dropping stone-like, with closed wings, into the abyss below." Their call is a loud, plaintive whistle, which is often heard in the forest at daybreak or toward evening, occasionally at all hours of the day; and when it is startled into flight it utters a succession of shrill, screeching whistles which serve to alarm all within hearing. The eggs, usually four to six in number, are deposited in a slight hollow in the ground sheltered by some rock, bush, or tree root. Attaining a length of twenty-six inches, the male Moonal has the mantle shining golden green, the outer coverts metallic bluish green, and the inner coverts, scapulars, rump, and upper tail-coverts bronze-crimson in some lights and purple edged with metallic bluish green in others, while the lower back is snow-white, the head and sides of the breast metallic green shot with blue and purple; the lower parts are black and the tail pale rufous. In the northwest Himalayas this species is replaced by the Chamba Moonal (*L. chambanus*), which differs chiefly in having the lower back golden green instead of white, and the lower parts entirely glossed with metallic golden green; while in northeastern Tibet and western China occurs the largest species of this genus, L'Huy's Moonal (*L. l'huysii*), which is similar to the common species except that the feathers of the rump are metallic golden green, margined with white, and the tail-feathers more or less spotted with white. The latter species occurs at higher altitudes than any of the others, being found on the rocky plateaus near the limit of perpetual snow, about 16,000 feet above the sea. The equally splendid Sclater's Moonal (*Chalcophasis sclateri*), which has been separated generically on the ground of having the top of the head covered with beautiful curly feathers instead of the racket-shaped ones of the others, is distinguished principally by having the upper tail-coverts white and the chestnut tail with a wide terminal band of white. It is an extremely rare species, found only in the Mishmi Hills in northeastern Assam.

Fire-backed Pheasants. — The next small group to be considered comprises the Fire-backed Pheasants, which are so named from the fact that the lower back in most is a fiery bronze-red or bronze-gold. The Crestless Fire-backs (*Acomus*), of which there are three species, ranging from the southern Malay Peninsula to Sumatra and Borneo, are small Pheasants approximating twenty inches in length, with a short, laterally compressed or hen-like tail, a large, naked white patch on the sides of the head, and single-spurred legs. Practically nothing seems to be known regarding the habits of these birds, almost the only specimens being those produced by natives, though they are known to frequent the dense, damp forests. In two of the species (*A. erythrophthalmus* and *A. pyronotus*) the males have the general color of the plumage glossed with purplish and steel-blue, while the females are entirely black, glossed like the males; but in the Black-crested Fire-back (*A. inornatus*) of western Sumatra the males resemble the females of the other species, the whole plumage being black; the adult female of the latter is unknown.

In the Crested Fire-backs (*Lophura*) the males are provided with a full crest composed of bare shafts terminating in a bunch of plumes; they have also a naked patch on the sides of the head and in addition a large wattle on each side of the neck. The four species comprising the genus are much larger birds, enjoying practically the same distribution as the last. Their habits are but little known, the one about which we have the most information being the Malayan Crested Fire-back (*L. rufa*) of Siam, Tenasserim, the Malay Peninsula, and Sumatra. Mr. Davidson says, "These birds frequent the thick evergreen forests in small parties of five or six; they never come into the open, but confine themselves to the forests, feeding on berries, tender leaves, and insects and grubs of all kinds, are very fond of scratching about after the manner of domestic poultry, and dusting themselves." The general plumage of the male in this species is black, glossed with purplish blue, the lower back and rump being fiery bronzy red, and the middle tail-feathers white; the female is chestnut throughout.

Wattled Pheasants. — Certainly one of the most striking members of the whole group is Bulwer's Wattled Pheasant (*Lobiophasis bulweri*) of the mountain forests of Sarawak, northern Borneo, the male of which has the head nearly naked and ornamented with three pairs of wattles, and a long, flowing tail of thirty-two pure white feathers. This splendid bird, which attains a length of thirty-five inches, more than half of which is taken up by the tail, has the neck and chest dark crimson, while the remainder of the plumage is black, each feather being margined with steel-blue. The female is but twenty inches long, and has only twenty-eight feathers in the tail, the general color of the plumage being brownish buff or rufous, finely mottled with black. Bulwer's Pheasant is an extremely shy bird, frequenting the dense mountain forests at an elevation not exceeding 2000 feet, remaining mostly on the ground, and running through the jungle with the greatest rapidity.

Eared Pheasants. — In the higher ranges of central and eastern Asia occur the Eared Pheasants (*Crossoptilon*), the five species of which are large birds between thirty-six and forty inches long, with a loose, hairy plumage, a long, rounded tail of from twenty to twenty-four feathers, the middle pair being curved and decomposed at the tips, and the sides of the face naked and papillate, while the sides of the head are ornamented by long white tufts which resemble horns or ears, whence of course their common name. Perhaps the best-known is Hodgson's Eared Pheasant (*C. tibetanum*) of the mountains of western China and eastern Tibet, where it is found in pine forests at elevations some 10,000 or 12,000 feet above the sea, and is indeed a splendid bird, being pure white both above and below, shading into gray on the longer wing- and upper tail-coverts, while the top of the head is covered with short, curly, black feathers, and the long, flowing tail is purplish bronze toward the base, shading into dark greenish blue and deep purple toward the extremity; this attractive plumage is further set off by the scarlet naked skin on the sides of the head and the reddish bill and legs. This species is said to be extremely sociable in its habits, as many as forty or fifty being found roosting in company, and even while rearing its young, still maintains its sociability; it feeds on leaves,

grains, roots, and insects, and is not highly esteemed as food. The other species appear not greatly different in habits so far as these are known, but they are mostly quite scarce, one species being represented by only a single skin.

Kalij Pheasants. – Inhabiting the Himalayas and the Indo-Chinese countries, but at much lower elevations than the last, is a large genus (*Gennæus*) of some sixteen species, a part of which are known as Kalij Pheasants, and the remainder, which exhibit a peculiar vermiculated upper plumage, as Silver Pheasants. They have a long, compressed, and vaulted tail of sixteen feathers, the middle ones long and drooping like the domestic cock; and both the sexes have the crest composed of soft, narrow feathers, which are some three inches long in the males and little shorter in the females. The male has a large portion of the sides of the head naked, and is armed with a single strong spur on each leg. Of the four or five species belonging to the first group we may select for brief mention the White-crested Kalij (*G. albicristatus*) of the western Himalayas and Nepal. About twenty-five inches in length, the male has the upper plumage mainly black, glossed with purplish and steel-blue, the feathers of the mantle, back, and rump being more or less margined with white, while the long, hairy crest is white, the chin and throat black, and the lower parts brownish white; the female is two inches shorter and has the whole plumage reddish brown. This fine Pheasant is most abundant in the lower regions, frequenting especially the foot-hills and lower valleys up to an elevation of about 8000 feet, and occurring in almost every variety of situation, such as low coppice and wooded jungle, ravines, and borders of the denser forests. "The call of the bird," says Captain Baldwin, "which may be heard at all times of the day, is a sharp *twut, twut, twut,* sometimes very low, with a long pause between each note, then suddenly increasing loudly and excitedly." They also produce a peculiar sound during the breeding season by flapping the wings against the body, apparently much as our Ruffed Grouse drums, but its object appears to be a challenge to a rival male, for they are very pugnacious at this time, and engage in fierce, often fatal battles. This sound may be closely imitated and is often resorted to for the purpose of securing them. They nest throughout their range, depositing the nine to fourteen reddish buff eggs in a simple hollow scratched in the ground under some stone, bush, or tuft of long grass. Perhaps the most beautiful member of the second group is the Silver Pheasant (*G. nycthemerus*) of southern China, the male of which has the crest and under parts black glossed with purple, and the upper parts white, most of the feathers with five or six narrow, black, concentric lines; its total length is forty inches, while the female is but half this length and mostly olive-brown finely mottled with dusky lines. Although a common bird in aviaries it is said to be very rare in a wild state and but little is known of its habits.

The **Koklass Pheasants** (*Pucrasia*), the seven species of which range throughout the Himalayas from Afghanistan to Tibet and Manchuria, are peculiar birds, easily distinguished by the absence of naked skin on the sides of the head, and a very remarkable crest of narrow, soft feathers, the outer ones, or those behind the ear-coverts, being fully twice the length of the central ones, while

the whole plumage of the males is lanceolate. The Common Koklass (*P. macrolopha*) of the western Himalayas has the under plumage and sides of the body ashy streaked with black in the male, the female being mostly rufous streaked with black. This is especially a forest-haunting species, frequenting the wooded ravines from an elevation of about 4000 feet up to near the limit of trees, though most abundant in the lower and intermediate ranges. It is a rather retiring, solitary bird, generally found singly or in pairs, never congregating in flocks even during the winter season, and in fact appears to be one of the few members of its class that remain paired for life.

Cheer Pheasant. — Also inhabiting the Himalayas, from Nepal to Chamba, is the Cheer Pheasant (*Catreus wallichi*), which is the only representative of its genus. The male attains a length of thirty-four inches, over twenty of which are taken up by the long, straight, pointed tail, while the female is but thirty inches and has the tail about fifteen inches. The male has a crest of soft, narrow feathers, quite three inches long and dark brown in color, the general upper plumage being pale buff, barred with black and pale blue bands; the female has the mantle chestnut, each feather with a pair of black oval spots. The Cheer inhabits the lower ranges, being partial to grassy hills with a scattered forest of oak and small patches of underwood, as well as hills covered with pines. Separating into pairs during the nesting season, they congregate in small flocks during the other seasons and are quite limited in their wanderings. "Both males and females crow at daybreak and dusk, and in cloudy weather sometimes during the day."

True Pheasants. — We have now come to a consideration of the true Pheasants, which are comprised in three genera and upward of thirty species, five of which are known only in a fossil state from the Miocene and Pliocene of central or western Europe, thus proving beyond question the great antiquity of the group, and showing also that the distribution was formerly more extensive than at present, the range now being from southeastern Europe, across central Asia, to Japan and Formosa. They are for the most part gorgeously plumaged birds of large size for the group, few being under thirty inches and some exceeding six feet in length, much of which, however, is taken up by the long, straight, narrow, and pointed tail. The male has the sides of the head naked and covered with brilliant red skin; there is no crest, but the ear-tufts are considerably developed and point backward, and each leg is provided with a pair of spurs. Certain of the Pheasants are among those most frequently seen in aviaries and, being fairly hardy and adaptable in disposition, breed readily in confinement or semiconfinement; and several of the species are known to interbreed, not only in captivity but in a state of nature. Thus the Common Pheasant (*Phasianus colchicus*), which is perhaps really native in southern Turkey, Greece, and parts of Asia Minor, was introduced into the British Islands some sixteen or seventeen centuries ago, and at a much later date the Chinese Ring-necked Pheasant (*P. torquatus*) was imported, with the result that the two species have intermingled to such an extent that it is rare indeed to find a typical, pure-bred example of either. The Common Pheasant has also been introduced into many parts of Europe, and this, together with the Ring-necked, Japanese Green Pheasant

(*P. versicolor*), and others, has been introduced into various parts of North America, but the Ring-necked species appears to be the only one that has gained a permanent foothold, being now fairly abundant in Oregon, Washington, and adjacent states, and on certain game preserves in the East, notably in western Vermont. Notwithstanding the apparent thorough establishment in Great Britain, it is said to be doubtful if they could long hold their own without the fostering care of man, with the result that large sums are annually expended in keeping up the preserves. The extent of certain of these great game preserves may be judged from the fact recorded by Newton that in 1883, 134,000 Pheasants' eggs were sold from one estate in Suffolk, and 101,000 in 1893, while 9700 birds were killed upon it. The question of whether it can be considered dignified "sport" to kill hand-reared birds is perhaps one that must be settled by individual standards.

As already hinted, the Common Pheasant (*P. colchicus*) is a very handsome bird, the male having the top of the head bronze-green, the rest of the head and neck dark green shading into purple on the sides and front; mantle, chest, breast, and flanks fiery orange-chestnut, the former narrowly margined with rich purplish green, the latter widely edged with rich purple, the upper back and shoulders mottled in the middle with black and buff and margined with consecutive bands of buff, black, and orange-red, and tipped with purplish lake, the lower back, rump, and upper tail-coverts red-maroon, glossed with purplish lake; the under parts are dark purplish green and dark brown mixed with rufous; the tail is olive down the middle, with narrow, remote black bars, widely edged on each side with rufous, and glossed with purplish lake; the length is about thirty-seven and a half inches, of which the tail includes a little over twenty-one inches. The female is mainly sandy brown, barred with black, and attains a length of only twenty-five inches. These birds are ordinarily very shy and retiring in their habits, frequenting woods and the neighborhood of cultivation where there is thick covert, coming out more or less into the open to feed at morning and evening. They are essentially ground birds, but when put up by dogs or beaters rise with a loud *whir*, and then fly with astonishing swiftness. The nest is a mere hollow in the ground under ferns, brambles, or underbrush, and the eight to twelve broadly oval eggs are usually olive-brown in color.

In the limited space at command it will be quite impossible to give a full account of each form, but we may make a brief mention of the more important or interesting, beginning with the Talisch Pheasant (*P. talischensis*) of the southwestern shore of the Capsian Sea, which offers a transition as it were between the last and the Persian Pheasant (*P. persicus*), which differs in having the feathers of the breast and fore neck more golden-orange in color, and wing-coverts nearly white; it is an inhabitant of Persia. In northeastern Persia and northwestern Afghanistan the place is taken by the Murghab or Prince of Wales' Pheasant (*P. principalis*), which has the white wing-coverts of the last, but differs in having the upper parts more golden-orange tinged with bronze-red on the rump, while in the Zarafshan Valley occurs a slightly different race known as the Zarafshan Pheasant (*P. zerafshanicus*). Shaw's Pheasant (*P. shawi*) of eastern Turkestan

is another species resembling the Common Pheasant, but having the wing-coverts tinged with gray, and the feathers of the chest and breast edged with dark green; while most closely related to this is the Oxas or Severtzoff's Pheasant (*P. chrysomelas*) of the valley of Oxas, which has a triangular dark green spot at the extremity of each feather of mantle, back, and rump. The Mongolian Pheasant (*P. mongolicus*) of central Asia and Turkestan is a splendid bird, much resembling the Persian Pheasant, but distinguished at once by having a broad white ring around the neck, a feature which also characterizes the Chinese Ring-necked Pheasant (*P. torquatus*) and several of the following species, which otherwise differ in having the lower back, rump, and tail-coverts greenish or bluish slate-color. The latter species enjoys a wide range from eastern Siberia and Mongolia to Korea and eastern China, and is the species already mentioned as having been introduced into Great Britain, the United States, etc. Quite distinct from all other members of the genus is the Japanese Pheasant (*P. versicolor*), which has the under parts dark green and the upper parts deep glossy green, with the wing-coverts blue and the shoulders orange-red; it occurs in all the Japanese Islands except Yezo. The last to be mentioned is the wonderful Reeves's Pheasant (*P.* (*Syrmaticus*) *reevesii*), of the mountains of northern and western China, the male of which attains a length of six and a half feet, of which, however, the tail slightly exceeds five feet.

Barred-backed Pheasants. — Closely allied to the true Pheasants, and indeed formerly included with them, are three species known as the Barred-backed Pheasants (*Calophasis*), which have been separated on the ground that the tail is composed of sixteen instead of eighteen feathers, and the lower back and rump in the males being barred transversely with black and white. Of these Elliot's Pheasant (*C. ellioti*) inhabits the mountains of southern China and appears to be extremely rare. The others are Hume's Pheasant (*C. humiæ*), a still rarer species of Manipur, and Oates's Pheasant (*C. burmanicus*) of the southern Shan states. But little is known of the habits of these birds, their nidification being entirely unknown.

FIG. 101.—Golden Pheasant, *Chrysolophus pictus*.

Golden and Lady Amherst's Pheasants. — Beyond question the most gorgeously plumaged members of the entire group are the Golden and Lady Amherst's Pheasants (*Chrysolophus pictus* and *C. amherstiæ*) of western and southern China and eastern Tibet, the males of which have a full, long crest of hair-like feathers and a peculiar cape-like ruff of erectile feathers on the back of the head and neck, while the tail of eighteen feathers is long and vaulted, the central feathers being more than four times the length of the outermost pair. In the Golden

LADY AMHERST PHEASANT
(*Chrysolophus amherstiæ*)

Pheasant, the male, to quote from Mr. Ogilvie-Grant, has the top of the head, crest, and rump brilliant golden yellow, the square-tipped cape-like feathers covering the back of the neck brilliant orange, tipped and banded with black glossed with steel-blue, while the throat and sides of the head are pale rust-color the shoulder-feathers and remainder of under parts crimson-scarlet, and the middle tail-feathers black with rounded spots of pale brown; the tail is twenty-seven inches out of a total length of about forty inches. The female, which lacks the crest and ruff, is largely brown, mottled and barred with black and buff. Lady Amherst's Pheasant is considerably larger, the male attaining a total length of fifty inches, and is further distinguished by having the crest blood-red, the cape-like feathers pure white, margined and barred with black, and the mantle and chest dark green. As both these species stand confinement fairly well, they are often seen in aviaries, but in a wild state they are but little known. They interbreed freely, and the Golden Pheasant has been known to cross with the common domestic fowl and the Common and Reeves's Pheasant, the latter hybrid being an especially handsome bird, "with almost the entire plumage dull purplish Indian-red."

The **Jungle Fowls** (*Gallus*), of which four very distinct species are recognized, are natives of the dense jungles of the Indo-Malayan region and adjacent islands, and, as is perhaps well known, exhibit quite marked differences from the other members of the group, the males being provided with a high, fleshy comb along the middle of the head from the base of the bill backward, the margin being either serrated or entire. The chin, throat, and sides of the head are naked, the throat below the eyes being provided with two wattles, — or a single one in the Javanese species, — while the legs are furnished with long, sharp spurs. The plumage is of brilliant colors and the feathers mostly hackled, that is, long and pointed at the tips. The females, however, are plainer in plumage and lack the wattles, while the comb is rudimentary. In their native haunts the Jungle Fowls exhibit many of the characteristics so familiar to us in the domestic fowls; thus the males crow, and the females cackle on leaving the nest, a procedure sounding very strangely coming from the wild jungle. Although they may be quite abundant in a locality, they are very difficult to catch sight of, as they run with astonishing swiftness through the mazes of the dense vegetation, only rarely taking to wing. The cocks often engage in fierce battles, resorting, it is said, to certain secluded spots in the jungle, and not infrequently these encounters end in the death of the vanquished. The nest is a simple hollow scratched in the earth, and the eggs, like miniature hens' eggs, are from five to nine in number. The birds are omnivorous feeders, living on seeds, grasses, insects, and worms.

The Red Jungle Fowl (*Gallus gallus*) is said to be the original whence all the domestic breeds of poultry have been derived. It is a native of northeastern and central India, ranging south through the Malay Peninsula to Sumatra and east through Siam to Cochin-China. The male has the long hackles covering the mantle and rump orange-red or yellowish orange, with the breast black, slightly glossed with green. The domestic varieties are almost infinite, and so unlike the original as to retain little resemblance to it, one of the most remarkable being a

Japanese form in which the tail of the cock grows to a length of ten or fifteen feet.

The Ceylon species (*G. lafayettei*) is a handsome bird, having the hackles of the mantle golden orange, with a black band down the middle of each, while those of the lower back and rump are bright orange-red, with a heart-shaped spot of glossy violet on the terminal half of each. The chest, breast, and sides are also orange-red.

The Gray Jungle Fowl (*G. sonnerati*) of western, southern, and central India has the hackles of the neck and mantle black, fringed with gray, and with

Fig. 102. — Peacock-Pheasant, *Polyplectron bicalcaratum.*

a yellowish spot like sealing-wax near the tip of each. The Green or Javan Jungle Fowl (*G. varius*) of Java, Lombok, and Flores has the margin of the comb entire and the feathers of the back of the neck and upper mantle covered with short, square-tipped, purplish blue feathers, each edged with greenish bronze, while the lower mantle is golden green.

Peacock-Pheasants. — With the so-called Peacock-Pheasants (*Polyplectron*) we enter upon a very different type, which in a way connects the last with the Argus and other Pheasants. Of medium or small size, they have a relatively large, full, flat, and rounded tail composed of twenty-four feathers, each of which

is ornamented with one or two large, metallic, eye-shaped spots, while the sides of the face are nearly or quite naked, and the tarsi armed with two, or three, or exceptionally four, long spurs; the sexes are quite different in size and coloration. The half dozen species range from the Indo-Chinese countries through the Malay Peninsula and Sumatra and Borneo to the Philippines, the best-known being the Gray Peacock-Pheasant (*P. chinquis*) of the eastern Himalayas and Indo-Burmese countries, the male of which is mainly brown above, dotted with whitish, many of the feathers with a large, round, eye-shaped spot of metallic green and violet, changing to blue and purple; the eye-spots on the tail-feathers are in pairs, one on each side of the shaft, and in color are green or purple according to the way they are viewed; in the female the upper parts are brown mottled with paler, and the eye-spots mostly black. These birds are found mostly in the lower ranges of hills but little above sea-level, where they frequent especially thick bamboo jungle, being very shy and extremely difficult of approach. Their call notes resemble the syllables *ha-ha-ha-ha*, which they utter especially in early morning and evening, when they come out to feed. They are especially fond of the fruits of a certain tree, but they also feed on insects, worms, and snails. These birds are considered delicious eating, being taken by the natives in snares which are baited with their favorite berries. Quite closely related is the Malayan Peacock-Pheasant (*P. bicalcaratum*) of the Malay Peninsula and Sumatra.

Argus Pheasants. — Although, according to classical mythology, Juno is said to have transferred the eyes of Argus, after his death, to the tail of her favorite bird, the Peacock, it is not difficult to see how the name of Argus came to be associated with this splendid Pheasant, close of kin to the Peacock, which bears the hundred eyes, not indeed on the tail, but on the great wings. And, it may be added, the traditional acuteness of vision is well maintained, for of all the Pheasants none is more secretive and keen to observe approaching danger. The genus *Argusianus* embraces three species, one of which, however, is only known from a portion of a single wing-feather, the others being Gray's Argus (*A. grayi*) of Borneo, and the better-known Argus (*A. argus*), which range from Siam through the Malay Peninsula to Sumatra. Generically they are distinguished by the possession of a tail of twelve feathers, the middle pair in the male being enormously elongated and more than four times the length of the outer pair, while similarly the secondaries of the wing greatly exceed the outer quills; the sides of the face and throat are naked. The male Argus Pheasant attains a total length of seventy-two inches and the tail a maximum length of fifty inches, while the primary quills are about nineteen inches long and the secondaries thirty-four inches. The naked parts of the head are dark blue, the short crest is black, and the upper parts black beautifully mottled with buff, while the under parts are buff barred with black in front, and the remainder black with wavy bars of chestnut; the long middle tail-feathers are whitish with kidney-shaped black spots and blotches, and the primaries are beautifully ornamented and patterned with close-set rows of black and rufous spots, but the greatest beauty resides in the secondaries, which have the outer webs ornamented with a row of large eye-shaped spots, these gradually increasing in size toward the tips of the feathers.

The markings on the wings and tail are only seen to advantage as the male is displaying before the female, when the tail is held erect and the wings spread and thrown forward until they make a great circular fan or shield, behind which even the head is often concealed. Of the habits of the Argus Pheasant, Mr. Davidson writes entertainingly as follows: "They live quite solitary, both males and females. Every male has his own drawing-room, of which he is excessively proud, and which he keeps scrupulously clean. They haunt exclusively the depths of the evergreen forests, and each male chooses some open level spot — sometimes down in a dark, gloomy ravine entirely surrounded and shut in by dense cane-brakes and rank vegetation; sometimes on the top of a hill where the jungle is comparatively open — from which he clears all the dead leaves and mud for a space of six or eight yards square, until nothing but the bare clean earth remains, and thereafter he keeps his place comparatively clean, removing carefully every dead leaf or twig that happens to fall on it from the trees above. These cleared spots are undoubtedly used as dancing grounds, and the males are always to be found at home, roosting at night on some tree close by. They are the most difficult birds I know of to approach." The female is a plain bird of mottled and barred black and buff without the eye-spots on the wings, and but thirty inches of total length. Like the male, she lives quite solitary, but has no cleared space, and wanders about the forest apparently without any fixed residence. But little appears to be known regarding their nesting habits.

Gray's Argus is smaller and has the mantle and wing-coverts black mottled with white and rufous, while Rheinardt's Argus Pheasant (*Rheinardius ocellatus*), separated as a distinct genus on the ground that the secondary quills are not longer than the primaries, has the tail in the male even more elongate, being sixty inches out of a total length of eighty-four inches; it is a native of the mountains in the interior of Tonkin, but is very rare, at least in collections, and little is known of its habits.

Pea Fowls. — The final genus to be noticed embraces the splendid Pea Fowls (*Pavo*), which, in addition to their gorgeous coloration, are distinguished at once by having the upper tail-coverts enormously elongated into a magnificent train which far exceeds the tail in length. Three species are recognized, one of which, however, is of rather doubtful status, being perhaps a domestic variety and from an unknown locality. Of the other species the Common Peacock (*P. cristatus*) is a native of the Indian peninsula, Ceylon, and Assam, but is now spread as a familiar domestic bird throughout most of the world, having been in domestication in Judea, certainly from the time of Solomon, while in Greece it appears to have become well known after Alexander's Indian expedition. From Greece it spread to Rome and gradually westward, "and in many different ways has touched human life and fancy. It was the bird of Juno to the Greeks and Romans, and emblematic of a glorified body to the early Christians; its feathers have adorned many a throne and shrine, and the perverted luxury of the later Roman empire made an entrée of the tongues and brains." Fortunately too well known to need description, a brief account of it in a wild state may be given. It is an extremely shy bird, frequenting mostly the lower elevations and moun-

tain slopes, being partial to broken and jungly ground where good cover exists, near water on the one hand, and cultivation on the other. Where such favorable conditions exist the Peacock is sure to abound, and in many localities it is said to exist literally in myriads, being protected by the more or less superstitious reverence of the native population, who deplore if not absolutely prohibit its slaughter. It is a rather omnivorous feeder, subsisting on land snails, insects of all kinds, worms, small lizards, and tiny frogs, but preferring apparently grain, juicy grasses, and buds, and being at times very destructive to young plantations and growing crops. The old males are in full plumage from June to December and may often be seen displaying their gorgeousness before a group of admiring females, for the Peacock is polygamous, consorting with four or five hens; at the close of the breeding season the feathers of the train are cast.

The Burmese Pea Fowl (*P. muticus*), which ranges from Burma through the Malay Peninsula to Java, is slightly larger than the last, the full-plumaged male being over eighty-two inches in length as against a maximum of seventy-eight in the common form. In addition it is distinguished at once by having the feathers of the crest longer and equally webbed on either side of the shafts, instead of naked quills with fan-shaped extremities; another difference is in the wing-coverts and shoulders being black in place of buff barred with black, as in the Common Peacock, and the neck and under parts green instead of blue. Its habits are very like those of its relative except that it is perhaps a more strictly sylvan or forest-haunting bird.

THE HOACTZIN

(Suborder *Opisthocomi*, Family *Opisthocomidæ*)

Among living birds it is rare indeed to find within the limits of a single species a combination of characters which entitles it at once to generic, family, and subordinal rank, but such is the distinction of that most curious of birds, the Hoactzin (*Opisthocomus hoazin*), which is the sole tenant of the family *Opisthocomidæ* and suborder *Opisthocomi*. It is a small, quite Pheasant-like bird in appearance, about twenty-three inches in length, with a long, loose crest of rather stiff-shafted feathers, relatively stout feet and legs, long, rounded wings, and a long, slightly rounded tail composed of ten feathers; the eyes are set in the midst of a patch of bare skin and provided with bristly lashes. The coloration above is dark brown glossed with olive and slightly varied with white, the wing-quills being chestnut and the under parts pale buff, shading into chestnut on the sides

Fig. 103. — Hoactzin, *Opisthocomus hoazin*.

and abdomen, while the tail is broadly tipped with yellowish white; the sexes are alike. The skeleton and soft parts of the Hoactzin exhibit a number of remarkable features which are quite unknown in other birds. Thus the breast-bone has two lateral edges parallel for two thirds the length and then divergent, so that it is actually wider behind than in front. The keel is only developed on the posterior part of the sternum, the front portion being aborted or cut away, a condition which has been apparently brought about by the pressure of the enormous crop, which has also excavated a deep cavity in the surface of the great pectoral muscles. "Furthermore," says Newton, "this crop is extremely muscular, so as more to resemble a gizzard, and consists of two portions divided by a partial constriction, after a fashion of which no other example is known among birds." In addition to these peculiarities, the bones of the shoulder girdle are completely fused to one another and to the breast-bone.

The home of the Hoactzin is in the northern and western portions of South America, from Colombia to Bolivia, but especially in the country watered by the Amazon. It is met with mainly on low trees and bushes along the shores of streams and lakes, in flocks usually of from ten to twenty individuals, and, as might be premised from the above enumeration of skeletal characters, it enjoys but weak powers of flight. "In the early morning or in the late afternoon," says Quelch, "they will be seen sitting in numbers on the plants, while toward the middle of the day, as the fierce heat of the sun increases, they betake themselves to shelter, either in the dense recesses of the growth, or among the individual trees of denser foliage, or among the tangled masses of creeping and climbing vines, along the very edge of the water. Late in the evening, after feeding, they will be seen settling themselves down in suitable places for the night." They feed almost entirely upon leaves, of which they consume great quantities, especially of an arum, which imparts to the flesh a very strong, disagreeable odor, — whence the bird is often called the "Stink-bird" or "Stinking Pheasant." The nest of the Hoactzin is a rude affair of sticks loosely laid together and placed in bushes near the water, while the eggs, usually two or three in number, are oval, yellowish white profusely blotched and spotted with reddish. The young are hatched almost naked and have the thumb and index finger provided with claws by means of which they are enabled soon after birth to clamber about among the branches, thus making the nearest approach in appearance to a quadruped found among existing birds. In a valuable contribution on the weapons and wings of birds, Mr. F. A. Lucas says: "Soon after the hatching of the eggs the nestlings begin to crawl about by means of their wings and legs, the well-developed claws on the pollux and index being constantly in use for holding and hooking to surrounding objects. If they are drawn from the nest by means of their legs, they hold on firmly to the twigs both with bill and wings; and if the nest be upset by means of a rod pushed up from below, they hold on to all objects with which they come in contact by means of bill, feet, and wings, making considerable use of the bill, not only to reach objects above them, but also, with the help of the clawed wings, to raise themselves to a higher level. When the parent bird is driven from the nest, owing to the close approach of a boat,

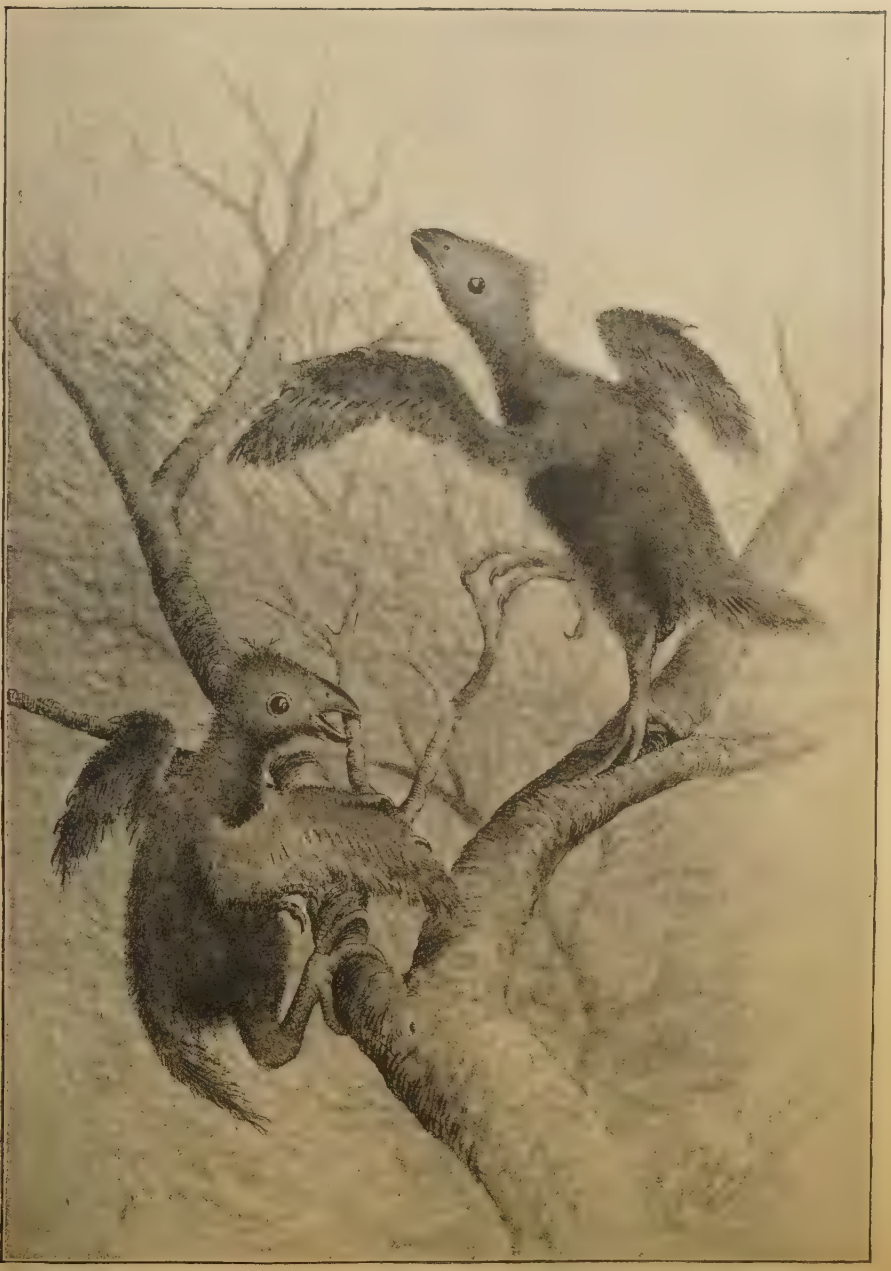


FIG. 103 a. — Young Hoactzins, *Opisthocomus hoazin*. (Courtesy U. S. National Museum.)

CHAPTER XXII

THE CRANE-LIKE BIRDS

(Order *Gruiformes*)

TECHNICALLY speaking, the Crane-like birds, to go no further afield, may be said to possess, in common with the *Galliformes* on one side and the *Charadriiformes* on the other, the split (schizognathous) or incomplete band (desmognathous) form of palate, a double head to the quadrate bone, the distal ends of the ilium and ischium united, and no slip to the accessory femorocaudal muscle above the sciatic foramen. From the Fowl-like birds (*Galliformes*) the other two orders differ in having the basal end of the coracoids separate instead of united and crossed, in the absence of the spina interna sterni muscle, and in the bill not being decurved or vaulted, while the two orders are themselves diagnosed by the heterocœlous dorsal vertebræ and 2-notched or entire sternum in the *Gruiformes*, and opisthocœlous dorsal vertebræ and 4-notched sternum in the *Charadriiformes*.

In less technical language it may be stated that a majority of the forms included within the limits of this order are waders, though the Bustards, Wekas, Kagu, and others are preëminently terrestrial. All appear to agree, however, in the absence of a true crop, and in possessing an elevated hind toe, and always incompletely webbed front toes. But even admitting these relatively important points of agreement, the various groups differ quite widely in certain other structural characters, and the order seems on the whole a rather heterogeneous one, though it is perhaps as satisfactory a disposition as can be made at present. It embraces seven families.

THE RAILS, GALLINULES, AND COOTS

(Family *Rallidæ*)

The members of this family form a relatively compact group of small or medium-sized wading or swimming birds, distinguished among other characters by the extreme narrowness or compression of the body. They have rather long necks, small heads, and short, rounded, concave wings, while the legs are long and strong, as are the feet. They are not strong flyers, but depend rather upon their legs for escaping danger. The plumage is rather loose and "hairy," and habitual disuse of the wings has resulted in the loss of the power of flight in a number of cases, and as a result several species have actually become extinct within comparatively recent times, and many others seem likely to meet the same fate at no distant day. The Rails spend their lives largely in marshes, their slender

bodies permitting them to thread their way among the closest reeds and rushes with astonishing rapidity. While not exactly gregarious, community of tastes and wants brings them together in the marshes, often in immense numbers. The Gallinules are more frequently seen along the borders of the marshes, while the Coots frequent the water much after the manner of Ducks, and incline to go in flocks.

This family embraces about fifty genera and one hundred and eighty species, and is widely distributed throughout the globe, being, however, most abundant in the tropics, North America having only about fifteen forms. It is clearly a family of ancient origin, since numerous fossil species are known, the oldest being from the upper Eocene beds of France. The family is sometimes divided into three subfamilies, the first of which embraces the Rails proper, while in the others are included the Gallinules and Coots respectively. As it will be impossible in the space at command to describe them all, a few of the typical forms may be selected from each group.

True Rails. — The true Rails may be typified by the genus *Rallus*, which, according to Sharpe, includes some twenty-one forms, all but five of which are natives of the New World. These differ from their nearest relatives in having the slender bill as long as or longer than the tarsus. They are all very similar in their habits, and frequently in appearance as well. One of our best-known and most widely distributed species is the Virginia Rail (*R. virginianus*), which is found throughout the whole of temperate North America, passing as far north as British Columbia and Hudson's Bay, and wintering from the southern part of its summer range to Guatemala. It is about nine and one-half inches long, olive brownish above, broadly striped with blackish, with the wings and tail dark grayish brown, and the wing-coverts deep rusty, while the throat is white and the under parts cinnamon-rufous, barred or spotted on the flanks, and under tail-coverts with black and white. The Virginia Rail prefers very wet marshes, where it can wade rather than swim, although it can both swim and dive if forced by circumstances to do so. It is a very secretive bird and its presence might be almost unsuspected if it were not especially looked for, and like other members of its group it can hardly be forced to take wing. In spring it has a peculiar grunting note that has been likened to the sounds produced by a hungry pig, and at night or during very cloudy days the male utters an often-repeated guttural note that Mr. Brewster describes as *cut, cutta-cutta-cutta*. This "when heard at a distance of only a few yards has a vibrating, almost unearthly quality, and seems to issue from the ground directly beneath one's feet." The food of this species consists of aquatic insects, snails, worms, and various seeds. The nest is placed on the ground in marshes, generally in a tussock of grass, and is a rather neat affair of grasses. The eggs are from six to twelve in number, and have a creamy white ground over which is spread spots and speckles of rufous-brown. The King Rail (*R. elegans*) is what may be called a larger edition of the Virginia Rail, resembling it quite closely in all but size, being from seventeen to nineteen inches in length. It is, however, generally much lighter above, and has the wings and tail olive-gray, the neck and breast cinnamon-rufous, and the abdomen and sides rufous, barred with white. It frequents the

fresh-water marshes of the eastern United States, but is not a very abundant species and comparatively little is known of its habits. Its nest is made in marshes and is often raised several inches above the general surface by means of withered weeds and grasses; the number of eggs is usually nine or ten. The Clapper Rail (*R. crepitans*), an allied form of the Atlantic and Gulf coasts of the United States, is a frequenter of grassy, salt-water marshes and mangrove swamps, and although not exactly gregarious, lives somewhat in colonies and is frequently found in great numbers. It is a shy, skulking bird, rarely taking wing, and when it does so, flying with a heavy, labored flight. It feeds on small crabs, minute crustaceans, and seeds, and in fall becomes excessively fat, when it is highly esteemed for food. Local races of this form are known in Louisiana and Florida, and several other species are known in various parts of North America. Of the Old World representatives, the Water Rail (*R. aquaticus*) is found in Europe and central Asia in summer and in northern Africa and India in winter, and the Caffre Rail (*R. cærulescens*) in South Africa, while the Indian Rail (*R. indicus*) is a native of eastern Siberia and Japan, returning southward in winter. The habits of all are similar.

The **Sora** or **Carolina Rail** (*Porzana carolina*) of temperate North America may be taken as the representative of another large and widely distributed genus of some sixteen species. It differs from the true Rails in having a short, stout bill which is not more than two thirds the length of the tarsus. It is about eight and one half inches long and is more or less olive-brown above and white below, with the front of the head, chin, and throat deep black, and the flanks barred with black. It is an inhabitant of fresh-water marshes, where, especially during the migrations, they often congregate in thousands. They feed largely on seeds, particularly those of the wild rice, and in fall become very fat and are then killed in great numbers for the table. Like the others of its race it is shy and rarely seen unless searched for, and when standing silent and motionless among the reeds and rushes of its home is almost invisible. It has a variety of notes and calls, especially during the nesting season, and the clear, whistled *kee-wee* from a thousand voices in a well-stocked marsh suggests the "springtime chorus of piping frogs." They breed in the marshes, building a very slight nest of grasses on some bog or tussock, and lay from seven to twelve drab-colored, brown-spotted eggs.

Fig. 104. — Corncrake, *Crex crex*.

Corncrake. — Quite closely allied to the last and having the same stout bill, but a much shorter middle toe, is the Corncrake, or Land Rail (*Crex crex*), of Europe and central Asia, which occurs somewhat regularly in Greenland and occasionally in eastern North America. It has a length of about ten inches, and is yellowish brown above, each feather with a dark center, and white below, with the flanks broadly barred with brown and buff. This is one of the commonest of British birds, being

found in rich pastures and meadows, where it skulks and hides, or runs with the greatest swiftness and ease. Its low, creaking cry, which Mr. Hudson says may be imitated by rapidly passing the thumb-nail along the teeth of a fine comb, is sounded incessantly from meadows and fields. The nest is made of grass and dry leaves and is placed on the ground among growing grain or grass. The eggs are seven to ten in number, reddish with brown and gray spots.

Pygmy Rails. — Not far separated from the last are the pretty little Pygmy Rails (*Corethrura*) of Africa and Madagascar, of which nine species are recognized. They are only six or seven inches long and are chiefly remarkable, so far as plumage goes, for the laxness of the feathers and the soft tail, which is almost concealed by its coverts. The Rufous-chested Crake (*C. rufa*) of South Africa has the head, neck, breast, and shoulders chestnut, while the body is black, more or less streaked with white. This species, Andersson says, "frequents stagnant waters, thickly fringed and studded with aquatic herbage, amongst the ever progressive decay of which it loves to disport itself and to search for food. It is very shy and retiring in its habits, seldom going far from effective cover, and gliding through the mazes of rank vegetation with astonishing ease and swiftness."

Gallinules. — The Gallinules and Coots, as already pointed out, are sometimes referred to separate subfamilies, and again to a single subfamily. Collectively they differ from the Rails in having a frontal process or shield at the base of the upper mandible, while among themselves they differ regarding the toes, these being without lateral lobes in the Gallinules and with them in the Coots. Both groups enjoy a wide geographic distribution, the former being, however, most numerous in genera and species.

The common or so-called Florida Gallinule (*Gallinula galeata*) may be taken as typical of the Gallinules. It is found throughout the whole of tropical and temperate America, ranging as far north as Canada and south to Brazil and Chile. It is a small bird, only twelve or thirteen inches in length, dark bluish slate-color above and whitish below, the back and scapulars marked with olive-brown, and the flanks sparingly white-streaked. The frontal shield and bill are bright red in life, the latter tipped with yellowish, while the legs are greenish with the upper parts of the tibia scarlet. They frequent especially reedy and bushy marshes along the shores of ponds and lakes, and among the tangled vegetation of which they make their way with ease and grace. They are exceedingly timid and conceal themselves among the rank vegetation on the slightest indication of danger. When surprised they run nimbly and when hard pressed take to the water, where they swim and dive well, and can rarely be forced to take wing, and when they do the flight is short, as, with dangling legs, they drop at the first opportunity. Mr. William Brewster has given an entertaining account of the habits of a pair on which he made extensive observations near Cambridge, Massachusetts. Of the male he says: "His manner of swimming and of feeding from the surface of the water was very like that of a Coot. He sat high and accompanied the strokes of the feet with a forward-and-backward nodding motion of the head and neck, accentuated at times as he reached out

to seize some tempting morsel. On land he walked like a Rail, threading his way deftly among the stems of the bushes and tall rushes, stepping daintily, lifting and putting his feet down slowly, and almost incessantly picking up his tail with a quick, nervous motion which caused the under coverts to flash like the sudden flirt of a handkerchief. As he picked his food from the vegetation at his feet, the head and neck were shot forward and downward at intervals of about a second, with a peculiarly vivid, eager motion. His manner of walking and feeding also suggested that of the Guinea-hen, the body being carried low and in a crouching attitude, while the movements of the head partook of that furtive swiftness which is so characteristic of this barnyard fowl." These Gallinules are very noisy birds, particularly during the nesting season, and have a great variety of calls, one of the most common being a loud, explosive *chuck*. All the notes, however, are "loud, harsh, and discordant, and nearly all curiously hen-like." The nest is a rather unsubstantial structure of reeds and grasses, usually raised a few inches above the shallow water surrounding it, and but slightly hollowed. The eggs are from eight to thirteen in number, buffy white spotted and speckled with brownish.

Moor-hen. — Closely allied to the last is the Moor-hen, or Water-hen (*G. chloropus*), of the Old World, being, however, slightly smaller and with the frontal shield truncated instead of pointed at the back. It is an abundant bird in the British Islands, where, according to Hudson, if "it is not molested, and the stream, or pond, or ditch it inhabits is close to the homestead, it becomes almost domestic in its habits, and will freely mix with the poultry and share their food." Otherwise it has similar habits and frequents much the same localities as the Florida Gallinule, building a similar nest among the reeds or rushes. Two or three broods are reared in a season, and "it has been observed that the young of the first brood sometimes assists the parents in making a new nest and in rearing the young of the second brood." Other species to the number of half a dozen are found in South America, Africa, Australia, Oceanica, etc.

Fig. 105. — Purple Gallinule, *Ionornis martinica*.

Purple Gallinules. — Similar to *Gallinula*, but having a more slender form and oval rather than slit-like nostrils, are the beautiful Purple Gallinules, of which several genera are recognized, all with handsome plumage of chiefly opaque blue, purple, and green. The American Purple Gallinule (*Ionornis martinica*), mainly of tropical and warm temperate America, is about twelve and one half inches long, with the upper parts a bright olive-green, brighter on the wings, and the head, neck, and lower parts dark, rich purplish blue. The frontal shield in life is bright blue, the bill bright red tipped with yellow, the iris crim-

son, and the legs and feet yellow. This is essentially a southern species and is not common in the United States above the southern line of states. Like the others of its kin, it frequents the dense vegetation of marshes, where it feeds on mollusks, worms, and seeds. In Jamaica, where it is known as the "Sultana," it is an abundant resident of the lowland ponds and marshy rivers, and is so bold and fearless as to appear in the open and stroll about with little heed to the passer-by. The nest according to Audubon is placed at a height of two to three feet from the ground, in a dense cluster of rushes fastened together by the birds. The eggs, five to eight in number, are similar to those of the Florida Gallinule, but with a paler ground color. To further show the varied and beautiful plumage of these birds, we may briefly describe the Green-backed Purple Gallinule (*Porphyrio smaragdonotus*) of South Africa. This bird, to quote from Sharpe, has the "head, hind part of the neck, and wing-feathers glossy violet; the back and rump, dull glossy green; the cheeks, throat, and fore part of the neck and under parts of the body, violet-blue, while the tail is dull green, and the vent-feathers pure white; while living, the frontal shield and bill are blood-red, and the legs and feet dark pink. They haunt the reedy borders of ponds and valleys."

Fig. 106. — Moho, *Notornis mantelli*.

Notornis. — Before leaving this group there is a very curious New Zealand bird that is worthy of notice. It is a large Gallinule-like bird, called by the natives the Moho (*Notornis mantelli*), and was first made known to science from fossil or subfossil remains found in association with bones of the Moa. A few years later (1849) a single extraordinary bird was captured alive by some sailors near Resolution Island, and parts of it falling into scientific hands, it was decided that it was referable to the fossil form, which had hitherto been supposed to have met the fate of its erstwhile companions, the Moas. Since that time only three additional examples have been captured, the second in 1851, the third in 1879, and the last in July, 1898, showing that although exceedingly rare it has still managed to escape extinction. The first three examples having been preserved by unskilful hands were not in very good condition for study, but from an examination of the best of these, which is now preserved in the Dresden Museum, it was determined that although very close to the fossil form it should be regarded as distinct, and it was given the name of *Notornis hochstetteri*. This view is entirely confirmed by the last specimen, which was fortunately received entire at the New Zealand Museum, and in condition that permitted a fairly complete

study of its anatomy and soft parts. It may be described as a stocky bird about twenty-five inches in length, with a short, very thick bill and exceedingly strong feet and legs. The wings are short and rounded and quite useless for flight, the quills being soft and the webs more or less unconnected. In color it is dark purplish blue, shaded on the back and wings with olive-green, while the bill and legs are red. Nothing is known of its habits beyond the fact that it is very fleet of foot, probably spending most if not all of its life on land. The stomach of the last one taken was filled with small bits of sedge and grass; but the bill appears needlessly strong for securing such a diet, and it seems probable that it feeds on seeds or other hard substances when these are procurable.

Another species known as the White Swamp-hen (*N. albus*) was once found on Norfolk and Lord Howe islands, but is now extinct, only a single specimen being preserved. It was entirely white with the bill and legs red.

Coots. — We now come to the Coots, which are distinguished, as before mentioned, by the broadly lobed toes which adapt them to a more aquatic life than the others. Of the dozen species known, all belong to the genus *Fulica*, and may be distinguished by the uniform slaty or plumbeous color, the head and neck being darker, almost black in the adults, the edge of the wing whitish, and the bill usually whitish or yellowish. Although two thirds of the species are natives of the New World, only one, the American Coot (*F. americana*), is found in North America proper, though the European species (*F. atra*) is accidental in Greenland. Our Coot is a bird from thirteen to sixteen inches long and has the bill milk-white, with the terminal portion and the frontal shield dark brown. It is found throughout the whole of North and middle America and most of the West Indies, and in many places is very abundant, going about usually in small parties, occasionally in flocks of large size. They swim well and accompany the motion of the feet by a bobbing motion of the head and neck. They are very noisy birds, having a variety of loud, cackling notes which are frequently uttered. Dr. B. W. Evermann has recently given a good account of their feeding habits as observed on Lake Maxinkuckee, Indiana. They arrived from the North in great numbers early in September and were soon found over all parts of

Fig. 107. — American Coot, *Fulica americana*.

the lake, and he regards them as being as thoroughly aquatic as any species of Duck, swimming and diving with equal facility. They were not observed walking on the shore, but spent the time in relatively shallow water some distance out. They were found at first to be feeding exclusively on the tender winter buds of the wild celery (*Vallisneria spiralis*), which they secured by diving in water which varied in depth from four to twenty five feet, preferably between four and eighteen feet. Later when the supply of winter buds gave out they ate the leaves and roots of the wild celery, as well as numerous other aquatic plants. Dr. Evermann states that "the Coot dives with greater abruptness than any Duck I have observed. The body turns very quickly and is usually in a nearly vertical position before entirely submerged. . . . The longest time any individual was observed to remain under water was sixteen seconds, and the usual time in water four to ten feet deep was about nine seconds." After feeding on the wild celery the Coot is regarded by Dr. Evermann as the equal of the celebrated Canvas-back Duck as a table bird. At other times they feed on crustaceans, worms, insects, and seeds, and are not then as fine flavored. The nest of this species is made of reeds and grasses and is placed among the reeds of fresh-water marshes. The eggs are from eight to fifteen in number, pale buffy white, thickly speckled with fine spots of dark brown.

To give a slight idea of the other species we may mention briefly the three found in Argentina. The Red-gartered Coot (*F. armillata*), so named on account of the bright red naked portion of the leg above the foot, has the bill yellow with red basal spots, and the frontal shield yellow, margined with red. The Yellow-billed Coot (*F. leucoptera*) may be known by the yellow bill and shield, and the Red-fronted Coot (*F. rufifrons*) by the bright scarlet bill and shield.

A single fossil Coot has been described from Pleistocene beds on the Chatham Islands, and a species of large size (*Leguatia gigantea*) has become extinct on Mauritius.

THE CRANES, COURLANS, AND TRUMPETERS

(Family *Gruidæ*)

The second of the coördinate families into which Crane-like birds (*Gruiformes*) are divided comprises the Cranes proper, as well as the minor groups which are assumed, in the system of classification we are following, to be most closely related to them. It must be confessed, however, that the present grouping is not agreed upon by all ornithologists, but this simply illustrates another case of the difficulty experienced in arriving at a uniform classification of groups that are confessedly of close affinity. The selection of one set of characters as a basis for classification may give results quite different from those to be obtained with another set, and it thus becomes a matter of extreme difficulty to determine satisfactorily the characters to which most weight should be given. Suffice it to say that, all things considered, the present grouping is perhaps as satisfactory as any that can be devised in the present state of our knowledge, which is unfortunately far from complete, regarding many of the forms included.

The family is divided into three subfamilies, — the *Gruinæ*, or true Cranes, the *Araminæ*, or Courlans, and the *Psophiinæ*, or Trumpeters. The especially distinguishing marks will be set forth under each heading.

The Cranes (Subfamily *Gruinæ*). — Although externally resembling the Herons and Storks with which, indeed, they were formerly united, the Cranes really constitute a very well marked group of birds, no one of which is likely to be confused with any other when once their distinctive characters are understood. They are all birds of large size and frequent grassy plains as well as marshes. They have long legs and neck, generally a long bill, which is equal to or longer than the head, and long wings in which the inner secondaries are rather longer than the primaries, and are generally composed of drooping plumes with more or less dissociated webs. The tail is rather short and composed of twelve feathers. The toes are short, especially the posterior toe, which is so much elevated above the other three that its claw scarcely touches the ground. The powder-down patches, so characteristic of the Herons, are absent, except in the anomalous Kagu and the Sun-Bitterns. In the structure of the skeleton and the soft parts the Cranes depart widely from the Herons and Storks, the most important difference being the split (schizognathous) instead of the band form of the palate, and the slit-like (schizorhinal) form of the nostrils. A further structural feature of much interest, which is present in most Cranes, is afforded by the great length and peculiar convolution of the trachea or windpipe. In the young chick, as it is about to emerge from the egg, the windpipe is said to be perfectly simple, but with advancing age this organ elongates and coils upon itself, after the manner of a French horn, within the keel of the breast-bone. The extent of this coiling appears to reach its maximum development in the Whooping Crane, when a length of no less than twenty-eight inches of the windpipe is packed away within the hollowed keel before it passes into the lungs. The entire length of the windpipe in this bird is about five feet, which is nearly or quite the total length of the bird itself. It is apparently upon this great length of the trachea that the powerful, resonant, and trumpet-like voice of the Cranes depends, as on a similar organ does the voice of the Trumpeter Swan. It has been said on high authority that a striking point of difference between the Whooping and Sandhill Cranes is the absence of convolutions in the trachea of the latter, but this is incorrect, for while not convoluted to as great an extent in the former it is nevertheless distinctly folded. Beautiful preparations of the trachea of all three American species are in the United States National Museum, and all are distinctly convoluted.

Another distinguishing mark is afforded by the condition of the nestlings, these being covered with down and able to run about within a few hours after they are hatched. The feather-tracts and their disposition are also quite peculiar.

The Cranes number about nineteen species and are distributed over the whole of North America as far south as Mexico and Cuba, and the greater part of Europe and northern Asia, whence they extend into northeast Africa, Lower Egypt, northwest India, and the Yangtse basin in China. In the more north-

ern parts of their range they are strictly migratory, while in the more southern portions they are less or not at all so. By some students they are referred to only one or two genera, while by others they are divided, mainly on external characters, into nine or more. It is clearly a very ancient group, since no less than seventeen fossil forms have been described, the oldest of which comes apparently from the Eocene of England with half a dozen or more nominal species found in the Eocene and later horizons of North America.

Whooping Crane. — We may begin the detailed consideration of the Cranes with the typical and largest genus (*Grus*), which embraces more than a third of the species, three well-marked forms of which are found in North America, the largest being the Whooping Crane (*G. americana*). This magnificent bird is from fifty to fifty-four inches in length and has a spread of wings of about ninety-two inches. In the mature bird the plumage is pure white throughout, with the exception of the quills which are black, while in the young the white is overlaid by patches of rusty, especially above. In the young bird the head is feathered, but when it has attained maturity the cheeks as well as the entire crown are bare, this character being sometimes made the basis of a generic separation. The Whooping Crane is practically confined to the central portion of the country, ranging north as far as the Saskatchewan, and spending the winter in the marshes and swamps of Florida, Texas, and central Mexico. Its principal avenue of travel is the Mississippi Valley, and it rarely wanders far from this track. In former days it probably enjoyed a much wider distribution, for according to Alexander Wilson, one of America's pioneer ornithologists, it once nested at Cape May, New Jersey, but its great size and conspicuously white plumage made it a too tempting mark, and it has been forced to seek wilder and more open country. It feeds largely upon vegetable substances, such as roots of the water-lily and other aquatic plants, and in its winter home is said to be fond of frequenting fields where corn, peas, sweet potatoes, etc., have been grown, where it picks up such as may have been accidentally left, and it also feeds on aquatic insects, frogs, reptiles, and field mice. Although a few pairs may still stop in the Northern Central States to rear their young, the main body pass farther north. Mr. Ernest E. Thompson (now Thompson Seton) reports it as a tolerably common migrant, but a rare summer resident in Manitoba, where it is locally known as the "Flying Sheep," while according to Sir John Richardson, it frequents every part of the fur countries. "It migrates," he says, "in flocks, performing its journeys at night and at such an altitude that its passage is known only by the peculiarly shrill screams which it utters. . . . It rises with difficulty from the ground, flying low for a time, and affording a fair mark to the sportsman; but if not entirely disabled by a shot, fights with great determination, and can inflict very severe wounds with its formidable bill." Instances have been known of this bird driving its bill deep into the bowels of a hunter when not successful in warding off its blow. The nest is said to be placed in a marsh and the eggs, apparently two in number, are grayish white sparsely marked, especially at the larger end, with bold patches of dark rusty brown.

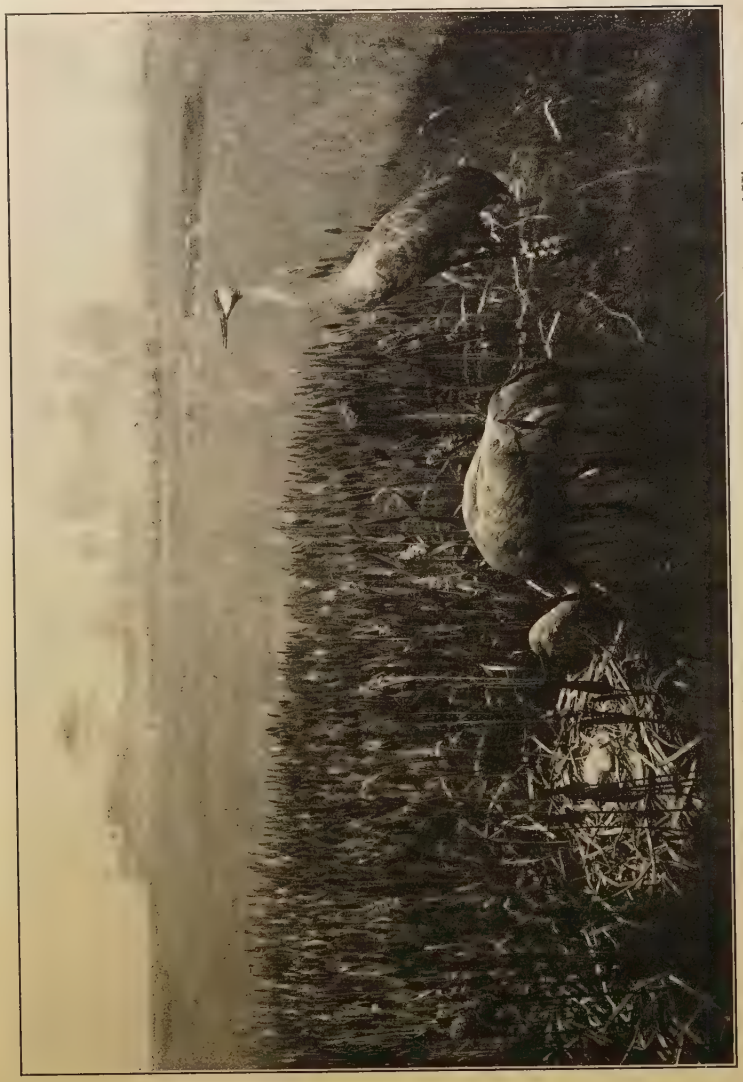


Fig. 108.— Sandhill Crane, *Grus mexicana*. (Courtesy of the American Museum of Natural History.)

Sandhill Crane. — The most abundant American species is perhaps the Sandhill Crane (*G. mexicana*), which is found from the "Mississippi Valley west to the Pacific coast, south to Mexico, and eastward along the Gulf coast to Florida and Georgia." It is smaller than the last, being only forty to forty-eight inches long, and has a more slender bill. In the adult the entire plumage is a deep slate-gray, sometimes tinged or washed with rusty, the primaries becoming darker and the cheeks and throat paler. The young are brown throughout, and as in the young of the Whooping Crane the head is entirely feathered, the cheeks remaining so even when the bird is mature. This species does not frequent the seashore, nor is it usually found in wet situations, "but prefers dry prairies, plowed fields, sandy hills, and like places," where it feeds on all the small animals it can catch, such as mice, frogs, grasshoppers, and probably young birds, as well as succulent roots, seeds, etc.

Dr. Coues, in his usual felicitous style, has given the following account of the habits of this bird: "Thousands of Sandhill Cranes repair each year to the Colorado River Valley, flock succeeding flock along the course of the great stream, from their arrival in September until their departure the following spring. Taller than the Wood Ibises or the largest Herons with which they are associated, the stately birds stand in the foreground of the scenery of the valley, the water now reflecting the shadow of their broad wings, then the clear blue sky exhibiting in outline their commanding forms. Such ponderous bodies, moving with slow-beating wings, give a great idea of momentum from mere weight — of force of motion without swiftness; for they plod along heavily, seeming to need every inch of their ample wings to sustain themselves. One would think they must soon alight fatigued with such exertion, but the raucous cries continue, and the birds fly on for miles along the tortuous stream, in Indian file, under some trusty leader, who croaks his hoarse orders, implicitly obeyed. Each bird keeps his place in the ranks; the advancing column now rises higher over some suspected spot, now falls along an open, sandy reach, swaying meanwhile to the right or left. As it passes on, the individual birds are blended in the hazy distance, till, just before lost to view, the line becomes like an immense serpent gliding mysteriously through the air. When about to alight, fearful lest the shadows of the woods harbor unseen danger, the Cranes pass by the leafy intricacies where the Ibises and other less suspicious birds feed, and choose a spot for the advantage it may offer of uninterrupted vision. By nature one of the most wary and discreet of birds, his experience has taught the Crane to value this gift and put it to the best use. His vigilance is rarely relaxed even when he is feeding, where less thoughtful birds feel perfectly secure. After almost every bending of his long neck to the ground, he rises erect again, and at full length and glances keenly on every side. He may resume his repast, but should so much as a speck he cannot account for appear to view, he stands motionless, all attention. Now let the least sound or movement betray an unwelcome visitor — he bends his muscular thighs, spreads his ample wings, and springs heavily into the air, croaking dismally in warning to all his kind within the far-reaching sound of his voice."

The nest of the Sandhill Crane is situated on the ground, sometimes in a marsh, but often in a perfectly dry location, being usually placed among rank-growing vegetation, which partially conceals it, yet does not wholly interfere with the vision of the occupant. The eggs are usually two in number, their average size being about four by two and a half inches, and their color olive-brown or drab, spotted with darker brown and purplish gray. The nestlings are covered at first with a soft, dense down, bright rusty on the upper parts and pale grayish on the lower. They are said to be unable to fly until they are nearly as large as their parents, whom they follow about until able to take wing, escaping pursuit and danger meanwhile by running and hiding. When taken quite small they are easily tamed and are said to make engaging pets, though somewhat dangerous on account of their propensity to use their sharp bills.

Little Brown Crane. — Hardly to be distinguished from the last except in size is the Little Brown Crane (*G. canadensis*) of the extreme northern portions of the continent from Hudson's Bay to Alaska, whence it migrates through the western United States east of the Rocky Mountains to Mexico. It was formerly regarded as the young of the Sandhill Crane, but its length of about thirty-five inches together with a decidedly shorter tarsus are sufficient marks by which to distinguish it. This species was found by Dall to be a common bird at St. Michael's, Alaska, as well as at the mouth of the Yukon, where the eggs were deposited in a slight depression on the sandy beach without any pretense of a nest. Its habits and appearance are similar to those of the Sandhill Crane, with which it has often been confused.

European and Lilford's Cranes. — We may now turn to the Old World for the remaining members of the group, pausing first to consider two species that are quite closely allied to our Sandhill Crane, these being the so-called Common Crane (*G. grus*) of Europe, which retires in winter to northern and eastern Africa, and Lilford's Crane (*G. lilfordi*) of eastern Siberia, which in winter migrates to the northwestern part of India. These were formerly regarded as constituting a single species, but their distinctness seems now to be generally accepted. Both are about thirty-six inches in length, the former being dark ashy gray, including the secondaries, while the latter is much paler, the general color being pearly gray, with the ornamental inner secondaries inclining to white. The Common Crane is said to have been abundant in the fen country of England down to the close of the seventeenth century, but it has long since been driven from there and only occurs as an occasional very rare straggler. Of its winter home in the Holy Land, Canon Tristram writes: "The Crane is well known, and is next to the Ostrich the largest bird in the country. It only visits the cultivated region at the time of its spring migration, when a few pairs remain in the marshy plains, as by the waters of Merom, but the greater number pass onward to the north. In the southern wilderness, south of Beersheba, it resorts in immense flocks to certain favorite roosting places during the winter. The clouds of these enormous birds, four feet high and many eight feet from wing to wing, quite darken the air toward evening." A few may linger to rear their young in Italy, but the majority pass much farther north, some to the

chill polar soils of Lapland, but the greater number to Russia, North Germany, and Scandinavia. A delightfully entertaining account of the breeding habits of this species in Lapland has been given by Wolley, from which we cannot forbear to quote a few lines. After much searching he found the nest containing two eggs in a great swamp, and, although no Cranes were in sight, he concealed himself in a dense growth of bushes, and waited for the return of the owner of the nest. "It was already about midnight; at length, as I had my glass in the direction of the nest, which was three or four hundred yards off, I saw a tall gray figure emerging from amongst the birch trees, just beyond where I knew the nest must be; and there stood the Crane in all the beauty of nature, in the full side-light of an Arctic summer night. She came on with her graceful walk, her head up, and she raised it a little higher and turned her neck sidewise and upward as she passed round the tree on whose trunk I had hung the little roll of bark. She probably saw that the eggs were safe, and then she took a beat of twenty or thirty yards in the swamp, pecking and apparently feeding. At the end of this beat she stood still for a quarter of an hour, sometimes pecking and sometimes motionless. At length she turned and passed her nest a few paces in the opposite direction, but soon came in to it; she arranged with her beak the materials of the nest, or the eggs, or both; she dropped her breast gently forward, and, as soon as it touched, she let the rest of her body sink gradually down. And so she sits, with her neck up and her body full in my sight, sometimes preening her feathers, especially of the neck, sometimes lazily peeking about, and for a long time she sits, with her neck curved like a Swan's, though principally in the upper part. Now she turns her head backward, puts her beak under the wing, and so she seems fairly to go to sleep."

The other species (*G. lilfordi*) assembles in the same immense flocks in its Indian winter home, and spends the summer in or close to the Arctic Circle. The nests are constructed on the ground in marshy, swampy places, and the eggs, two in number, are four inches long by two and five eighths inches broad, and pale greenish olive-brown blotched and spotted with darker shades of the same. The remaining closely allied forms are the White-headed Crane (*G. monachus*) of eastern Siberia, southern Japan, and China, which has the sides of the neck, throat, and entire sides of the face pure white; the Black-necked Crane (*G. nigricollis*) of Koko-nor, characterized by the smoky black head and neck, and the Japanese Crane (*G. japonensis*), an immense bird fifty inches long and almost pure white throughout, which ranges in summer over eastern Siberia, Korea, and Japan, and winters in China.

Asiatic White Crane. — Quite similar to our Whooping Crane, but longer, and with the hinder part of the crown feathered, is the Asiatic White Crane (*G. leucogeranus*), which is sometimes placed in a separate genus (*Sarcogeranus*). According to Hume, who observed it in India, this species differs distinctly in that the windpipe is not convoluted within the breast-bone, but divides into two nearly equal tubes about three inches before it enters the lungs. As a result its notes are very weak as compared with those of any other Crane, being simply

whistles, "from a mellow one to a peculiar feeble shrill shivering whistle." While in its winter home it frequents especially the shallow rain-water lakes, where it feeds very largely on aquatic and other forms of vegetation, its snowy white plumage making it ever an object of interest. The nest of this species as observed in Siberia is made among dense reeds of various layers of these plants, and the eggs, two in number, are gray, streaked with dusky lines.

The **Sárás Crane** of India is typical of another group of three species which have been separated under the generic name of *Antigone*. They have long and slender bills, but are especially characterized by having the crown of the head bare and covered on the hind neck for a distance of several inches with coarse crimson warts, mixed with which is a scant covering of black hairs. The species above mentioned (*A. antigone*), which is found in northern and central India, is a large bird nearly fifty inches long, light pearly gray above, with a broad white band on the upper portion of the neck, separating the bare neck from the gray of the back. The Sárás Crane is not as gregarious as are many other species, being usually observed in pairs or very small parties near water, nor do they migrate like most of the others. They are tamer and more confiding than is usual among Cranes, and members of a pair are much attached to each other. The form found in Burma, Cochin China, and the Malay Peninsula has been separated as a distinct species (*A. sharpei*), differing from the other in the absence of the white collar, while the Australian Crane, the "Native Companion" of the colonists (*A. australasiana*) of eastern Australia, has the neck feathered to the nape. Gould speaks of the latter bird as stately and elegant in all its movements when on the ground, and often soaring at a vast height, uttering the while its hoarse, croaking cry. It nests on the ground, depositing its two eggs in a slight depression on the bare plains, or occasionally in swampy lands near the coast.

White-naped Crane. — Allied to the last, but separated on minor differences in the feathering of the head, is the great White-naped Crane (*Pseudogeranus leucauchen*) of eastern Asia. This is the so-called Sacred Crane of the Japanese, being the one so generally represented in its various picturesque attitudes in their numerous works of art. It was formerly protected and existed in great numbers, though it was allowed to be "hawked," and this with great ceremony, only by nobles of the highest rank; but since the power of the Daimios has waned the restrictions have been removed and it may now become the prey of any one, with the result it has been nearly exterminated in this, its winter home.

Paradise Crane. — We may now consider two rather closely related forms in which the bill is comparatively short, and the convolutions of the windpipe within the keel of the breast-bone much less than in most Cranes. The face and crown are wholly feathered, and there are lengthened pointed feathers pendent from the breast, while the tertiary plumes of the wings are so much elongated as to be often mistaken for the tail when the wings are closed. Of these the Paradise or Stanley Crane (*Tetrapteryx paradisea*) is a native of South Africa. It is a handsome bird, about fifty-two inches long, leaden blue in color, with the upper parts of the head white and the tips of the long, drooping plumes

black. It appears to be rather generally distributed throughout its range, though nowhere very abundant, frequenting mostly the open country in pairs and often at a distance from water. It feeds in the wild state on small bulbs, seeds, reptiles, insects, and small mammals, and is then very shy and difficult of approach, but it is readily tamed and may be fed from the hands on a great variety of substances. Of its habits in the Transvaal Mr. Thomas Ayres writes: "These Cranes are not at all uncommon in this country. In the summer months they are generally seen in pairs, stalking about the open flats in search of insects; in winter they congregate in certain localities and live sociably together. These birds feed on seeds and roots as well as on insects, and their flesh is not at all bad eating. Blue Cranes (as this species is locally called) sometimes rise to an immense height in the air, uttering their peculiar loud guttural note. When on the ground they frequently amuse themselves by dancing around each other, with wings extended, bowing and scraping to each other in a most absurd manner, not a little curious to see."

Demoiselle Crane. — The other species mentioned above as closely related to the last is the Demoiselle Crane (*Anthropoides virgo*), which is widely dispersed from southern Europe to central Asia and northern China, migrating in winter to Africa and India. It is the smallest of all the Cranes, being only about thirty inches long. The general color is pearl-gray, but it may be further distinguished by its long and very copious white ear-tufts, while the neck and the pendent breast-plumes are black. In winter they associate in often immense flocks, feeding mainly in the grain fields, but retiring during the heat of the day to the larger rivers, where they may often be seen standing in the shallow water. Of their nesting habits, as observed in Bulgaria, Cullen says: "The nest of the Demoiselle Crane is, without exception, made on the ground, usually amidst some kind of young grain, but often amongst grass on fallow land. The nest — if indeed such it can be called — is made by the birds pulling up or treading down the grain, grass, or stubble for the space of about two feet and scratching the shallowest possible hollow in the middle of the bare patch thus formed." The eggs, always two in number, are placed side by side with the small ends invariably pointing in the same direction. In color the eggs are usually a dirty pale green, more or less thickly spotted with umber-brown.

Wattled Crane. — The final member of the present group is the Wattled Crane (*Bugeranus carunculatus*) of South Africa, which is distinguished by a remarkable pendent lappet of skin on each side of the neck below the chin. It is about fifty-five inches in length, and is slaty gray above and black below, with the neck pure white. It is usually seen in pairs and is nowhere very abundant.

Crowned Cranes. — Differing considerably from those previously mentioned are the Crowned Cranes (*Balearica*) of Africa, being so named from the presence of a narrow, fan-shaped crest or "crown" of twisted wire-like bristles, each three and one half inches long, radiating from the back of the head. Structurally they are distinguished by the absence of convolutions in the trachea, together with the possession of compact bodies, long necks, and rather short conical bills, while the general color of the plumage is black or leaden gray, the

wings being white, with black primaries and secondaries, and dark brownish red tertiaries. The three known species are distinguished mainly on differences in the color and configuration of the bare spaces on the head. They occur in pairs or small parties, nesting in marshes and laying two usually bluish white unspotted eggs. Their habits are otherwise similar to those of other Cranes.

The Courlans (Subfamily *Araminæ*). — These are large Rail-like birds that were formerly placed directly with the Rails, which they closely resemble in external appearance, but when their anatomy came to be more carefully studied it was found that the whole skeleton, as well as the arrangement of the feather tracts, was distinctly Crane-like, the texture of the plumage and the form of the wings being the only essentially Rail-like features. A single genus (*Aramus*) of two closely related species are the only representatives, these being from twenty-four to about twenty-eight inches in length, with a slender, compressed bill nearly five inches long, both mandibles of which are decurved and turned slightly to one side at the tip, the latter as a result, it is said, of forcing the bill into the spiral opening of a certain land shell on which they largely feed. The legs are long and naked from the middle of the tibia, while the wings are broad and rounded, with the first quill scarcely longer than the tenth. The prevailing color of the plumage is dark brown, varying from a chocolate to an olive shade, with the head and neck and sometimes the back, wing-coverts, and lower parts striped or spotted longitudinally with white.

Fig. 109. — Brazilian Courlan, *Aramus scolopaceus*.

The Florida Courlan, Limpkin, or Crying-bird (*A. giganteus*), as it is variously called, is found in Central America and the West Indies, whence it ranges north to the Florida peninsula and the Rio Grande valley. It is known from the other species by the more general distribution of the white stripes over the body. In the Southern or Brazilian Courlan (*A. scolopaceus*) of eastern South America, the white markings are confined to the neck and head. Both species frequent the borders of swamps and marshy rivers, feeding largely upon mollusks, the shells of which they often pierce with their iron-like bills. The following account of the habits of the Southern Courlan is from the pen of W. H. Hudson, who observed them in Argentina: "By day the Courlan is a dull bird, concealing itself in dense reed-beds in streams and marshes. When driven up he rises

laboriously, the legs dangling down, and mounts vertically to a considerable height. He flies high, the wings curved upward and violently flapping at irregular intervals; descending, he drops suddenly to the earth, the wings motionless, pointing up, and the body swaying from side to side, so that the bird presents the appearance of a falling parachute. On smooth ground he walks faster than a man, striking out his feet in a stately manner and jerking the tail, and runs rapidly ten or twelve yards before rising. At the approach of night it becomes active, uttering long, clear, piercing cries many times repeated, and heard distinctly two miles away. Those cries are most melancholy and, together with its mourning plumage and recluse habits, have made for the Courlan several vernacular names. He is called the Lamenting Bird and Crazy Widow, but is more familiarly known as the Carau. Near sunset the Caraus leave the reed-beds and begin to ascend the streams to visit their favorite fishing grounds. They are very active at night, retiring again at the approach of morning, and sometimes pass the day perched on trees, but more frequently concealed in dense reed-beds. As the breeding season draws near they become exceedingly clamorous, making the marshes resound day and night with their long, wailing cries. The nest is built among the rushes, and contains ten or twelve eggs as large as a Turkey's, slightly elliptical, sparsely marked with blotches of pale brown and purple on a dull white ground, the whole egg having a powdery or floury appearance. When the nest is approached the parent birds utter sharp, angry notes as they walk about at a distance. The young and old birds live in one flock until the following spring."

The Trumpeters (Subfamily *Psophiinæ*). — In some respects affording a connecting link between the Cranes and certain other Crane-like birds are the peculiar South American birds known as Trumpeters. They are small birds about the size of a large fowl, although they have of course much longer legs and neck, their total length being from seventeen to twenty-one inches. The head is of moderate size and the bill short and sometimes swollen, suggesting, as long ago pointed out, the "expression of face" of the Pheasants, or as another writer has put it, "large, long-legged, blackish Guinea-fowls." The wings are short and rounded, — the fourth quill longest, — with the inner secondaries as long as the primaries. The wings are not much used for flight, as the birds depend largely upon their running powers for escaping danger. The plumage is soft, the head and neck especially being covered with soft, velvet-like feathers, a condition produced by the upward curvation of the central shafts, combined with the soft, downy structure of the finer divisions. The under tail-coverts particularly are long and lax.

These birds take their name of Trumpeter from the loud, prolonged, and far-reaching trumpet-like cry which they utter, it is said, with the bill widely opened. It appears that the males only possess this voice, and it has been very generally supposed that it was made possible by a great elongation and convolution of the windpipe, but, according to Beddard, the latter statement requires confirmation. It has also been stated that the windpipe communicates with an air space, apparently after the fashion of the Emeu, but this is also questioned

by Mr. Beddard, who states as his opinion that the specimen on which this statement was based must have been imperfect or malformed, since he does not find it in any of those he has examined. They are included in a single genus (*Psophia*) and seven rather closely related species, and are most numerous in Amazonia and near-by countries. The best-known appears to be the Common Trumpeter (*P. crepitans*), or Agami, as it is called by the residents of its native country. It is the largest species, being about twenty-one inches long, and is black throughout, except that on the lower throat the feathers are purple, tipped

Fig. 110. — Common Trumpeter, *Psophia crepitans.*

with shining purple, and a patch of deep rusty brown extends across the middle back and wing-coverts. These birds frequent the forests, going about in flocks often of several hundred, and feeding on fruits of various kinds as well as insects. The nest is placed on the ground, and the eggs, to the number of ten or more, are said to be bright green. The Agami is often tamed and domesticated by the natives of Brazil, and becomes very affectionate and much attached to its owner. It is often employed in protecting poultry, sheep, etc., its loud cry giving warning of the approach of danger. It apparently does not breed in domestication.

The remaining species differ slightly in size and coloration, and the interesting fact has been established that their ranges are often separated by moderately wide rivers, which seems to prove that they enjoy only limited powers of flight. Our illustration is that of the Common Trumpeter (*P. crepitans*) of British Guiana and the Rio Negro.

THE CARIAMAS

(Family *Cariamidæ*)

Eastern South America is the home of two very remarkable and closely related birds known as Cariamas or Chuñias, the systematic position of which has given rise to much discussion and difference of opinion. They are large, long-legged, crested birds, having a considerable superficial resemblance to the

Fig. 111. — Chuñia, or Burmeister's Cariama, *Chunga burmeisteri*.

African Secretary-Bird, and were formerly associated with it as aberrant members of the *Falconiformes*, but careful investigation of the osteology and anatomy of the soft parts has shown conclusively that this view cannot hold. They have

also some apparent affinities with the Storks, but all things considered, they appear to find their closest relationship with the Cranes, Trumpeters, and Bustards, though well entitled to be ranked as a distinct family.

The larger of the two, which is known as the Crested Cariama (*C. cristata*), has a total length of about thirty-two inches, and is yellowish gray, with numerous narrow darker and lighter cross-bands, except on the abdomen, while the wings and tail are blackish brown with broad white cross-bars. The forehead is ornamented with a tuft of erect plumes three inches or more long, and there is also a full pendent crest hanging down the hinder neck. The bill is bright red, and the bare greenish blue skin surrounding the large dark yellow eyes gives it a peculiarly animated expression. The legs and feet are reddish. It is a native of the campos of the interior of Brazil, whence it extends into the open districts of Paraguay and the adjoining parts of Argentina. It lives among the high grasses of the campos, running away, it is said, in a stooping posture to avoid discovery when approached, and taking to wing with extreme reluctance and only when actually forced to do so. It is highly regarded by the inhabitants as a destroyer of snakes, being protected by law, but it is said to feed principally upon insects and caterpillars, though occasionally eating berries and other fleshy fruits, and rarely, it would seem, snakes and other reptiles. It builds a nest in low bushes and lays two roundish, spotted, Rail-like eggs. Its loud, screaming cry is frequently heard.

The other species, known as the Chuñia or Burmeister's Cariama, has been made the type of a distinct genus (*Chunga burmeisteri*), and is found in northern Argentina. It is smaller than the other, being only twenty-eight inches long, darker colored, and with the frontal crest not more than an inch high. It frequents forest or bushy districts, spending the day in running about in the bush and roosting at night in high trees. Like the other species it has a loud, screaming voice which may be heard for a long distance, though when approached it becomes discreetly silent. The nest is placed in bushes, and the young birds are frequently taken when half fledged and soon take kindly to captivity.

THE BUSTARDS

(Family *Otididæ*)

The next family that we have to consider comprises the birds known as Bustards and Floricans. Typically they are birds of large size and bulky form, with rather long neck and lank, naked legs, and only three toes, all of which are directed forward. They differ considerably from the typical Crane-like birds and there has been much discussion regarding their proper systematic adjustment, many of the older ornithologists, for example, regarding them as allied to the Ostriches, a view which has little or nothing except mere external appearance in its support. They are undoubtedly a much-specialized group and appear to find their closest of kin among the *Charadriiformes* and the *Grui-*

formes. Structurally their most important characters are the three toes, absence of an oil-gland, the presence of after-shafts to the contour feathers, and the split form (schizognathous) of the palate and circular (holorhinal) nostrils. Certain of the forms possess a peculiar gular pouch, or a highly dilatable œsophagus, which may be inflated at the will of the bird, of which more will be stated later. They are all confined to the Old World and are comprised in a dozen genera

Fig. 112. — Great Bustard, *Otis tarda*.

and about thirty-five species. Although they possess ample wings they are essentially terrestrial in their habits, frequenting chiefly dry, open plains and steppes, on which account they might appropriately be called, as Gadow has suggested, the Steppe-Rails. Their strong legs and feet well adapt them to walking and running, which latter they do with great swiftness, though readily taking to wing when pressed. That the group is one of considerable antiquity is shown by the fact that two fossil forms are known from the middle Tertiary.

The **Great Bustard** (*Otis tarda*) may be regarded as typical of the first genus we shall consider. It is the largest European bird, an adult male being about forty-five inches long and weighing in the neighborhood of thirty pounds, while the female is some ten inches shorter and correspondingly lighter. In color the male is sandy rufous above, broadly banded with black across the back, the

primaries blackish brown and the remainder of the wing white, as are the three outer tail-feathers. The head is gray and provided on the cheeks with tufts of long, whisker-like feathers, which turn backward and downward; the lower throat is orange-chestnut, which forms a band across the fore neck, while the sides of the upper breast are rufous, barred with black, and the remainder of the under parts pure white. The female lacks the whiskers on the sides of the face as well as the rufous bands on the breast. This species was once a common and conspicuous bird in many of the more open districts of England, but has been exterminated as a resident for nearly three quarters of a century, occurring at the present time only as a rare straggler from the open country of Champagne or Saxony. It was once quite widely distributed over Europe, but is now very rare in France and Greece, no longer known in Scandinavia, and only to be found commonly in central and eastern Europe, central Asia, and northern Africa, although in the latter country it is becoming scarcer. In winter they visit India, during which time they associate in flocks of considerable size; but on the approach of spring they break up into pairs and resort to the great steppes and plains, either barren or under cultivation, for the purpose of rearing their young. At this season the male has the curious habit known as "showing off," which consists in inflating the throat pouch before mentioned until the ends nearly reach the ground, and at the same time spreading and raising the tail until it almost touches the neck, and elevating the wings and erecting the individual feathers until the bird looks like a huge ball of rumpled-up feathers. In this attitude it totters and struts about before the female in an exceedingly grotesque manner. It is also very pugnacious at this season, attacking others of its kind and even, it is said, human beings. The object of the gular pouch has been much speculated about, it formerly being supposed that it was for the purpose of carrying water to the female and young on the dry plains, but it has been definitely settled that it is simply an adjunct in the "showing-off" process, and at the close of the nesting season so completely disappears that its very existence has been denied again and again. It is not present in the female at any season. In a related Australian species the same effect is produced by the enormous dilation of the esophagus, there being no special sac, or pouch. The food of the Great Bustard consists principally of seeds, grain, and the tender shoots of various plants, but occasionally of insects, reptiles, and small mammals. The nest is simply a slight hollow scratched in the ground, usually in an open or grassy situation wherein are deposited the two or three large spotted eggs. In eastern Asia there is a second smaller and grayer species (*O. dybowskii*).

Little Bustard. — An allied species which ranges from southern Europe and northern Africa throughout central Asia is known as the Little Bustard (*Tetrax tetrax*). It is much smaller than the last, being only about seventeen inches long, and is without the whisker-like feathers on the cheeks, but possesses a full tuft of elongated plumes on the nape and hind neck. In color it is sandy buff above, coarsely vermiculated with black, and mainly white below, with two broad bands of black across the lower neck and breast. The female is lighter colored and is without the black bands in front. After nesting in the northern part of their

range they return, to the number of millions, to their winter homes, where they frequent the plains and are difficult of approach. Their habits are similar to those of the larger species.

Stanley Bustard. — Africa south of the Sahara may be regarded as the headquarters of the present group, and although we have not space to mention all, we may select a sufficient number to convey a fair idea of them. Thus the genus *Neotis*, which includes five species, may be known by the absence of the whisker-like feathers on the cheeks and by the long bill exceeding the length of the middle toe with its claw. Of these the Stanley Bustard (*N. caffra*), a bird about thirty-eight inches long, is found in South and East Africa. It is ashy black above, much waved and streaked, with the sides of the face, nape, sides of the neck, and entire lower parts white, while the top of the head, wings, and tail are white with black bands. In South Africa they are found on the plains in the interior away from the seacoast, feeding on seeds, insects, and small reptiles, preferring ground that has recently been burnt in which to hunt for their food. They are very shy yet stupid birds, for even where there is no cover, "if the sportsman take a large circle round and round, gradually nearing the bird, the Bustard will frequently squat down with his head to the ground, thinking he will be passed unnoticed, when the sportsman may run up to within easy shooting distance." At the "showing-off" season the males parade before the females, expanding the throat, uttering a loud booming noise, which can be heard at a great distance. Of the nest, Mr. Ayres says: "These birds frequently breed amongst the rocks and stones on the top of some hill; the nest is merely a slight excavation scratched in the ground with perhaps a handful of grass. The eggs are two in number, and the old bird sits so close that she will almost let one tread on her before she rises."

Pink-collared Bustard. — Closely allied but without the crest on the nape and hind neck is the Pink-collared Bustard (*Heterotetrax vigorsi*), which may be taken as typical of a group of three species separated under this genus (*Heterotetrax*). They are a third or more smaller than the last mentioned, the so-called Pink-collared Bustard being but twenty inches long, and dull ashy, minutely mottled with dark brown and black above, with the chin and upper throat jet-black. The whole plumage in life is glossed with a delicate pink luster which, however, fades after death. It is found usually in pairs among the scant herbage of the dry plains, and like the last has the habit of squatting close to the ground, where it fancies it has not been observed. Not far separated from this is the African Black Bustard (*Compsotis afra*), so named from the prevailing deep black color of the plumage, and the White-quilled Bustard (*C. leucoptera*), which has a large patch of white on the wing-quills.

Long-beaked Bustards. — The only remaining group of Bustards proper that we shall mention are the so-called Long-beaked Bustards (*Eupodotis*), of which three species are found in Africa, and a single one each in the Indian peninsula and Australia. They belong to a section of the family in which the feathers of the lower throat and the fore neck are conspicuously elongated so as to form a shield overhanging the crop, and further the crown of the head is strongly crested

and the wing more than three times the length of the tarsus. The South African species, known as the Kori Bustard (*E. kori*), is a bird of great size, the male attaining a length of over four and one half feet and a weight of between thirty and forty pounds. It is mottled ashy gray above and white below, the neck with a half collar of black in front, and the top of the head with the crest long and black. In the Transvaal, Mr. Ayres found it a not uncommon bird, living principally among the scattered mimosa bushes, and from its great fondness for the gum of these bushes it has received from the Dutch inhabitants the name of *Gum-Paauw*. They are usually seen single, though sometimes in pairs, which accords with Andersson's observations in Damara and Great Namaqua Land, who says: "This Bustard is usually found in pairs, but sometimes three or four are to be found together. Its flight is heavy, but nevertheless very rapid, and at night when changing its feeding ground it may be seen flying at a very great height." It feeds on insects, berries, reptiles, and the above-mentioned mimosa gum. In some parts of its range its flesh is regarded as excellent eating.

The Indian Bustard (*E. edwardsii*) is a little smaller than the Kori and differs, among other points, in having the greater wing-coverts ashy black, with a terminal white spot, instead of white, freckled with black. This species, according to Hume, is common throughout the drier, wilder, and more barren portions of central India and the Punjab, congregating during the rainy season in small flocks. Its favorite food consists of grasshoppers, but it also eats various seeds and fruits. During the breeding season the males display themselves before the females in a manner not unlike that described for the various other species, puffing out the throat, until "he seems to have a huge bag of feathers hanging down between his legs, which wabbles about while he struts here and there, with wings partly unclosed, and occasional sharp snappings of his bill." The nest is a slight depression in the ground, and unlined or thinly lined with a few blades of grass. Hume thinks that but a single egg is laid, since out of a hundred specimens two were never found side by side, although sometimes within a yard or two of each other, these he thinks belonging to different birds.

Still smaller and slightly darker is the Australian Bustard (*E. australis*), which is the native Turkey of the Swan River colonists. It is a fine-appearing bird, "and," says Gould, "when seen at freedom slowly stalking over its native plains, no Australian bird, except the Emeu, is so majestic, or assumes in its carriage so great an air of independence."

Floricans. — In the Indian peninsula there are two small Bustards known by the Anglo-Indian name of Floricans, the etymology of which is unknown, but surmised by Newton to be possibly from a mispronunciation of Francolin. They are referred to separate genera, the larger being called the Bengal Florican (*Houbaropsis bengalensis*) and the other the Lesser Florican (*Sypheotis aurita*). Among other things they may be known by the males being decidedly smaller than the females, and by their undergoing a second spring moult. The first is further distinguished by the presence of a crest on the crown, nape, and hind back, and by the tarsus being nearly half the length of the wing. The plumage is largely mottled black above, relieved on the lower back and rump with

brown, while the greater part of the wings is white and the lower parts black. The plumage of the female is remarkably different. This species is almost confined to eastern Bengal, where it is a resident the year round, living entirely on the uncultivated plains. Hudson has given a very entertaining account, unfortunately too long to quote entire, of the habits and nidification, derived mainly from native hunters. It appears that the sexes live apart for most of the year, going about in parties of three or four. "In the season of love the troops of males and females come into the same neighborhood, but without mixing. A male steps forth, and, by a variety of very singular proceedings quite analogous to human singing and dancing, recommends himself to the neighboring bevy of females. He rises perpendicularly in the air, humming in a deep peculiar tone, and, flapping his wings, he lets himself sink after he has risen some fifteen or twenty yards; and again he rises and again falls in the same manner, and with the same strange utterance, and thus perhaps five or six times, when one of the females steps forward, and with her he commences a courtship in the manner of a Turkey cock by trailing his wings and rising and spreading his tail, humming all the time as before." The nest is concealed in deep grass cover, at the foot of a thick tuft of grass and in a slight depression in the ground. The eggs, always two in number, are noticeably different in size and coloration, the larger and more richly colored producing, Mr. Hudson says, a male bird, while from the smaller and plainer colored one a female bird is hatched. The habits of the Lesser Florican are described as being quite similar to those of the Bengal species.

THE KAGU

(Family *Rhinochetidæ*)

In the far-away island of New Caledonia there is a remarkable bird known by the natives as the Kagu (*Rhinochetus jubatus*), the systematic position of which has given rise to almost as much discussion as that of the Cariamas. It was first made known in 1860, shortly after the French occupation of the island, its original describers first regarding it as a Heron and later as a Crane. It was soon after determined, both from external appearance and a study of its anatomy, to be probably nearest related to the Sun-Bitterns. It is a moderately long legged bird, with a body about the size of a common fowl, a moderately long bill, and a full crest, five or six inches in length, pendent from the back of the head. The plumage is of a light ashy gray color above, paler below, obscurely barred on the outer wing-coverts and tail with darker, the primaries and secondaries being also freckled with dusky brown, this latter feature only showing when the wings are spread. The drooping plumes are ashy gray, while the bill, legs, and feet are reddish orange. The Kagu runs quickly and has the habit of stopping suddenly and standing motionless, but when excited it stands straight, with erected crest, semi-expanded wings, and drooping tail, and when in a playful mood it throws small sticks and stones about with the bill. The birds call to each other, usually

about daybreak, in loud, piercing, yelping notes, continued for some time, which can be heard a mile away. It is said to be nocturnal in its habits, feeding on worms, insects, and small mollusks. Thus far, it appears, the nest and eggs of this curious bird have not been found in a wild state, although it has laid in con-

Fig. 113. — Kagu, *Rhinochetus jubatus*.

finement in the gardens of the Zoölogical Society of London, and more recently Mr. A. J. North has described several eggs laid in confinement in Australia. Two birds, presumed to be a male and female, were observed to form a nest of dried twigs and leaves at the bottom of a box in their aviary, in which a single egg was deposited. This was sat on for three weeks, one bird occasionally relieving the other, but as there was no sign of a chick in the egg it was removed. Two other eggs were subsequently laid and both proved infertile. These eggs

are described as being very similar in color and character of markings to those of a Gull or Tern, being about 2.40 by 1.85 inches, and close-grained, smooth, and slightly lustrous. In color they are pale brown, much dotted, blotched, and streaked with reddish umber. Of the habits of these birds in confinement their owner writes as follows: "From personal observations of the two birds I have had in confinement for over three years, the Kagu is fond of seclusion, but withal the one I regard as the male shows fight at the slightest provocation. Holding itself quite erect, with spread wings, panting breast, raised crest, and tail brought almost between its legs, the aspect of the bird appears very stately when prepared to give battle. A peculiarity shown when fighting is that it only attacks its opponent low down, so that when one holds a hand to the height of its body, it misses aim, but if held near the ground it administers a severe nip. When quarreling over a delicacy, the two birds pick at each other's legs."

More recently a correspondent of Mr. A. J. Campbell's residing in Sydney, Australia, has had a chick hatched in confinement, the period of incubation being thirty-six days. It is described as a fluffy ball with a big and heavy head, the color being dark brown with light fawn markings.

THE SUN-BITTERNS

(Family *Eurypygidæ*)

Coming again to South America, we have another group of remarkable Crane-like birds known as the Sun-Bitterns. They are small birds, about eighteen or twenty inches long, "something between a Rail and a Heron" in appearance, with rather short legs, a very thin neck, and a rather large head with a long, sharp-pointed bill. The wings are broad and ample and the tail relatively long and composed of twelve feathers. Of the peculiar structural features we may only mention that the breast-bone has a notch on each side, the oil-gland is generally naked, and numerous powder-down patches are scattered on various parts of the body. The skull shows a number of points of agreement with that of the Kagu. The plumage of the Sun-Bitterns is soft, the general color above being brown, variously barred and "variegated with black, brown, chestnut, bay, buff, gray, and white — so mottled, speckled, and belted either in wave-like or zigzag forms as somewhat to resemble certain moths." The upper mandible is black, and the lower one waxy yellow, while the iris is red and the legs and feet yellow. Two species are known, one (*Eurypyga helias*) found in Guiana and the interior of Brazil, and the other similar but slightly larger species (*E. major*) in Central America and Colombia. Comparatively little is known of their habits in a wild state beyond the fact that they frequent the muddy and wooded banks of great rivers, especially the Orinoco, where they may be seen singly or in pairs sunning themselves and spreading out the beautiful plumage. They take rather kindly to captivity and are often to be seen in zoölogical gardens, and on several occasions have made a nest and reared

their young. The nest appears to be placed low down in trees and the eggs, so far as known, are two in number, grayish in color and blotched and spotted

Fig. 114. — Sun-Bittern, *Eurypyga helias*.

with reddish, quite after the manner of the eggs of certain Plovers and Snipes. The food of the Sun-Bitterns consists largely of flies and other insects, which they secure by rapidly darting out the long neck.

THE FINFEET

(Family *Heliornithidæ*)

The last of the families of Crane-like birds remaining to be considered comprises the anomalous Finfeet, or Sun Grebes, which have been bandied from place to place in the system, finding successively a resting place near the Grebes, the Rails, and the Cranes, and their geographical distribution is as hard to interpret as their structure, for of the three genera and five species, one is found in Central and South America, three in Africa, and the last in eastern Asia. They are small or medium-sized birds, none of them exceeding two feet in length, while one, the American form, is but half this size. They have rather short legs, the toes with scalloped, lateral webs much as in the Grebes, a relatively long and slender neck,

and a moderately long bill. Their plumage is dense and close-set, and their general appearance is described as like that of a diving Rail. It is not necessary to enumerate the structural peculiarities. Their nests and eggs are unknown, and information concerning their habits is meagre in the extreme.

The American Finfoot (*Heliornis fulica*) is a uniform olive brown above and mainly white below, with the wings and tail brown, the latter edged with white, and the crown glossy blue-black, with the sides of the head streaked with brown and white. The bill is bright red and the toes clear yellow, crossed with bands of black. They frequent shadowy and quiet rivers, and feed upon fish, aquatic insects, and various seeds. They are said "to sit for hours on

Fig. 115. — Asiatic Finfoot, *Heliopais personata*.

a branch overhanging the water and half submerged, but diving is only resorted to in danger or when wounded." The voice when heard from a distance is said to resemble the barking of a small dog. The young, reported to be two in number, are said to be "hatched naked and carried about by the old bird," but obviously this requires confirmation.

Peter's Finfoot (*Podica petersi*) of South Africa is dark brown above, rather indistinctly spotted with ochreous on the back, and has the sides of the face and neck gray, and the lower parts mainly white. The upper mandible is black with red margins and the lower mandible red with black margins, while the legs and feet are bright red. This bird is rare and very shy and, according to Ayres, "it frequents the rocky streams of the interior of the country; can scarcely rise from the water, and generally flies along the surface, aiding itself with its feet, which are lobed; when disturbed it hides under a bank like the Moor-hen in England. It feeds on fresh-water shrimps and small fish."

The other species of this genus are found in West Africa and the Cameroons respectively. Of the Asiatic species (*Heliopais personata*) comparatively little is known.

CHAPTER XXIII

THE PLOVER-LIKE BIRDS

(Order *Charadriiformes*)

IFFERING from the last order (*Gruiformes*), with which in a number of particulars they seem to be most closely related, by the technical characters of opisthocœlous dorsal vertebræ and a four-notched instead of two-notched sternum, is this vast cosmopolitan order of so-called Plover-like birds. But as previously indicated, the selection of a popular name for a great group that will convey anything like an adequate impression of all the forms included in it is well-nigh impossible, and especially so in the present case, for what are taken to be the central or typical forms may be — indeed are — very unlike the outliers that are bound to them by a greater or less number of often minute or obscure but relatively important characters from the standpoint of classification. The typical Plover-like birds, or what Gadow calls the *Charadriiformes* in the narrow sense, are mostly Rail-like marsh or shore birds, with rather long necks, slender, long legs, and long, slender bills, which may be approximately straight, curved upward or downward, or, exceptionally, bent sideways, usually short wings and tails, and a dull-colored, often streaked, plumage. From these we pass to the aquatic, mainly oceanic, Gulls, Terns, Skimmers, and Auks and their immediate allies, and come by way of the somewhat anomalous Sand Grouse to the great and quite diversified group of Pigeons. The latter are in no sense aquatic and at first blush seem very unlike those first alluded to, and were it not for the pronouncement of comparative anatomy, we might be justified on mere external appearance in separating them quite widely, and yet the thread of apparent, though perhaps remote, kinship seems to run through them all.

The present order is divided into four suborders: the *Limicolæ*, embracing six families, among them the Plovers, Snipes, Pratincoles, Thick-knees, and Jacanas; the *Lari*, including the families *Laridæ*, or Gulls, Terns, and Skimmers, and the *Alcidæ*, or Auks; the *Pterocles*, which includes the single family *Pteroclidæ*, or Sand Grouse; the *Columbæ*, or Pigeons, divided among three families, — the *Didida* for the Dodo and Solitare, the *Columbidæ* for the great majority of Pigeons, and the *Didunculidæ* for the peculiar Tooth-billed Pigeons. The first two suborders are brigaded together under the name of *Laro-Limicolæ*, and the others into the *Pteroclo-Columbæ*, in accordance with their affinities. The characters of the various groups are set forth under the several headings.

I. LARO–LIMICOLÆ

THE PLOVERS, SNIPES, AND IMMEDIATE ALLIES

(Suborder *Limicolæ*)

This is a group of large size and very wide distribution, its members, as already suggested, being disposed among six families. They agree among themselves in having the slit (schizognathous) form of the palate, and, with the exception of the Thick-knees and certain Coursers (*Pluvianus*), with slit-like (schizorhinal) nostrils, while the oil-gland is tufted and the aftershaft present in the contour feathers. Another character of agreement is found in the spinal feather tract, this being forked on the body, while in all the toes are only partially or not at all webbed. The nests are placed on the ground, and the young are able to run about a few hours after birth, being then covered with a close and fluffy down. The first family to be considered includes the typical representatives, viz.:—

THE PLOVERS, SNIPES, CURLEWS, ETC.

(Family *Charadriidæ*)

Turnstones. — We may appropriately begin the consideration of this, the largest of the six families, with the interesting little Turnstones (*Arenaria*), so called from their constant habit of turning over shells and pebbles in search of their food of insects and crustaceans. Of the two species the Common Turnstone (*A. interpres*) is practically cosmopolitan, mainly along seacoasts, breeding in the Arctic regions, and in America migrating southward as far as the Straits of Magellan. It is about nine and one half inches long, with the upper parts including the wings mainly dusky, variegated more or less with rufous and white, the head being mostly white, and the chest a uniform deep black, while the rump, throat, and abdomen are pure white, and the legs and feet are orange; in winter the plumage is somewhat darker. It is observed singly or in small parties, sticking closely to the outer, especially rocky, beaches, and gleaning its food among stranded seaweed, and several have been observed to assist in overturning a stone too large for the effort of a single bird. Palmer mentions them as being exceedingly abundant in fall on the Pribilof Islands, where they become excessively fat. Their departure in flocks of a hundred

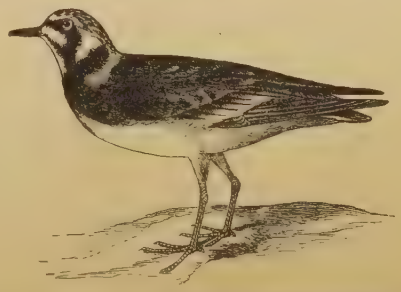


FIG. 116.—Common Turnstone, *Arenaria interpres*.

or more took place at evening, the flock rising and circling about several times until attaining the proper elevation, when they headed straight out to sea, often through a dense bank of fog, their destination being the Aleutians, some 200 miles away. The Black Turnstone (*A. melanocephala*) of the Pacific coast of North America is a little smaller and much darker and has the throat dusky instead of white.

Surf-bird. — Associated with the last, at least by American ornithologists, is the Surf-bird (*Aphriza virgata*), which is distinguished by its longer tarsus, emarginate tail, and swollen terminal portion of the bill. It ranges from Alaska to Chile, breeding at the north and feeding largely on crustaceans, which it secures by foraging among the retreating waves, often with the spray dashing over it. The nest and eggs are unknown, but Mr. Grinnell, who found the birds in the Kotzebue Sound region, states that he was informed by the natives that they nest about some small lakes far back on the tundra and next to the mountains, which confirms the experience of Mr. Nelson at St. Michael.

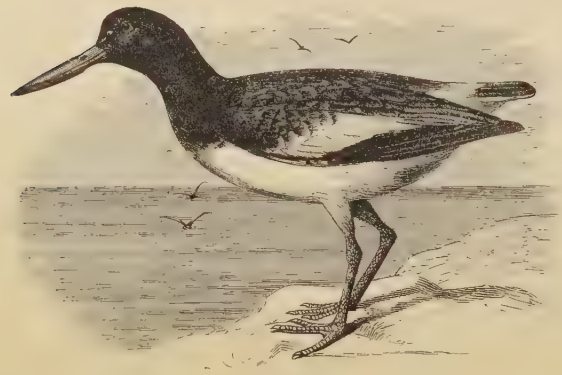


FIG. 117. — American Oyster-catcher, *Hæmatopus palliatus*.

Oyster-catchers. — Much larger than these, being sixteen to twenty-one inches long, are the Oyster-catchers (*Hæmatopus*), a maritime, nearly cosmopolitan group of a dozen species, so named from the fact that with their strong, compressed, almost knife-like bills they are able to force open the shells of clams, mussels, etc. They have very robust legs and feet, the hind toe being absent, and the tarsus reticulated on both front and back, while the plumage is largely black above, or in some species black throughout, and white below; the bill is bright red in life. In the American Oyster-catcher (*H. palliatus*) the rump is of a brownish slate-color, like the back and wings, and the iris bright yellow; while in the European Oyster-catcher (*H. ostralegus*) the rump is entirely white and the iris crimson. The former ranges along the seacoasts of temperate and tropical America from Nova Scotia and Lower California to Brazil and Patagonia, and the latter along the coasts of Europe and parts of Asia and Africa, occasionally reaching Greenland. The Oyster-catchers frequent the sandy beaches, usually in small parties, and are rather shy and difficult of approach. When in repose they walk with a stately step, but they can run with ease and swiftness, and when pressed soon take to wing and with swift flight

pass out of sight around some projecting point. They feed largely on shellfish. The nest is a mere depression in the sand, and the eggs, usually three in number, are buffy white spotted and blotched with chocolate. The female, it is said by many observers, only sits on the eggs at night or during dark days, otherwise leaving the sun and hot sand to perform the work of incubation. In the Black Oyster-catcher (*H. bachmani*) of the Pacific coast of North America the plumage is entirely blackish; its habits are similar to those of the forms already mentioned. Other species are found in eastern Asia, New Zealand, Australia, Africa, and southern South America.

Wattled Plovers. — As an example of a group of some eight or nine genera of mainly Old World forms, in which the tarsus is transversely scaled in front and reticulated behind, we may only mention the Wattled Plovers (*Lobivanellus*), three of the four known species of which are confined to Africa and the other to Australia. They are about a foot in length and may be distinguished at once by the presence of a distinct facial wattle and a well-developed spur on the wing, as well as by a small hind toe and somewhat lobed bill. Of the several species the Senegal Wattled Plover (*L. senegalus*) is a striking example, being brown tinged with green above, the wings black, and the tail white crossed by a broad black bar, while the chin is white, the throat black, and the remaining under parts dove-color; the wattle before the eye is yellow tinged with orange-red. It frequents river banks and the borders of marshes, singly, in pairs, or small flocks, and feeds largely on insects and small mollusks.

The **Lapwings**, of which there are many forms, take their name from their slow, flapping flight. They are quite closely related to the Plovers, from which they may be distinguished by the central pair of tail-feathers having more or less of white on their basal portions, while the blunt wings may or may not be spurred, and the hind toe present or absent; in several species the head is distinctly crested. For the most part they are gregarious birds, frequenting mainly open fields, downs, or sometimes marshy ground, and occasionally the seacoast in winter. Their food consists of insects and mollusks, which are secured at least partially at night.

One of the best-known species is the common Lapwing (*Vanellus vanellus*) of the northern portions of the Eastern Hemisphere, occasionally straying to Greenland, Alaska, and northern China. It is about thirteen inches long, and has the upper parts mainly metallic bottle-green, bluish, and coppery purple, the top of the head, chin, throat, and breast a uniform blue-black, while the sides of the neck and abdomen are white; the crest is very long, slender, and recurved; the hind toe is present but small. The Lapwing is one of the commonest and best-known birds of the order in western Europe, being especially abundant throughout the British Islands, where it is a resident during the whole year, and in the Arctic regions of Scandinavia and Siberia, where it is only a summer visitor. When on the ground it presents an elegant and graceful appearance, but when it takes to wing its heavy, flapping, Heron-like flight is quite in contrast. "But," says Mr. Hudson, "no sooner does he begin to practice his favorite evolutions in the air than a fresh surprise is experienced. Rising to a height of forty or

fifty yards, he suddenly dashes in a zigzag, downward flight, with a violence and rapidity unsurpassed by even the most aërial species in their maddest moments, and turning like lightning when almost touching the surface, he rises, to repeat the action again and again." The often-repeated note, which resembles the word *pee-weet*, has gained for it the name of Peewit in many parts of England. The nest, placed in a meadow, heath, or pasture, is a slight depression in the soil and perhaps lined with a few grass stems. The eggs are four in number, of an olive-green color, thickly spotted with black and brown; they are highly esteemed as food. These birds, in common with others of the order, have the habit of feigning injury when the nest or young are approached.

Cayenne Lapwing. — Closely allied, indeed sometimes placed in the same genus, is the Cayenne Lapwing (*Belonopterus cayennensis*) of northern South America, where, from its oft-repeated cry, it is also known as the *Teru-teru*. It is slightly larger and has a large reddish spine on the wing, but is otherwise quite similar to the European Lapwing. It is a resident and exceedingly abundant species on the great pampas, its rather pied plumage, red legs, crimson irides, rosy black-tipped bill, and coral-red wing-spurs making it a noticeable bird. It is of a spirited, aggressive disposition, a veritable tyrant among birds, and is engaged in constant warfare against most living creatures, "its special abhorrence being men, dogs, Rheas, and birds of prey generally." They usually pair for life and become so much attached to one spot that they absolutely refuse to be driven out even when the ground is turned up by the plow, swept by the parching dust-storms of summer or the cold gales of winter. Yet they are withal birds of undoubted joyous spirits, and Mr. Hudson has given a very entertaining account of a curious march that they are constantly indulging in. One bird leaving its mate flies to the vicinity of another pair, who "welcome it with notes and signs of manifest pleasure. Advancing to the visitor, they place themselves behind it, and then all three, keeping step, begin a rapid march, uttering loud drumming and rhythmical notes at regular intervals. The march ceases, the leader stretches out his wings, still emitting loud notes, while the other two, with puffed-out plumage, standing exactly abreast, stoop forward until the tips of their beaks touch the ground, and, sinking their voices to a murmur, remain for some time in this singular position. The performance is then over; the birds all resume their natural attitudes, and the visitor takes his leave." The nest is a shallow, circular hollow on the level plain and lined with a few grass stems; the eggs, four in number, are olive-green spotted with black. The old birds are very ingenious in diverting attention from the nest, sometimes trying to intimidate the enemy by loud cries and violent dashes; again feigning lameness or injury, or running a little distance from the real nest, they appear to arrange an imaginary nest. Two other species of this genus are also found in southern South America.

Crocodile Bird. — We may turn again to the Old World and mention briefly a number of other Lapwings, first among them the far-famed Crocodile Bird, or more properly the Egyptian Spur-winged Lapwing (*Hoplopterus spinosus*). It is a three-toed bird about thirteen inches in length, the general color above being chrome with a slight purplish gloss, while the greater wing-coverts, parts

of the median coverts, sides of the face and neck, as well as a collar around the latter, are white, and the crown, throat, fore neck, breast, and legs black; the wings are provided with a very long, sharp, jet black spur. This species is widely distributed from southern Europe through West Africa and East Africa as far as Albert Edward Nyanza, being especially abundant in Egypt and Nubia. It frequents the banks of rivers and lakes, as well as marshes and swamps, and is often rather shy and difficult of approach, although living on terms of amiable partnership with the crocodiles that now or once formed so conspicuous a feature of the great rivers. It appears to be the bird mentioned by Herodotus as entering the mouth of this great saurian for the purpose of feeding on leeches and particles of food that remain about the teeth, the animal obligingly opening its mouth for the purpose. It also apparently removes from the interstices of the skin bugs, leeches, and other small animals that find a lodging place, and in return for this hospitality warns the crocodile of approaching danger. Since the time of this ancient account many other competent and undoubtedly truthful observers have observed the phenomenon, among them Mr. J. M. Cook, whose very circumstantial account lack of space forbids our quoting. Of the two other species of this genus the one inhabiting Southeast and East Africa is known as the Blacksmith Plover (*H. speciosus*) from the peculiarly metallic, ringing sound of its notes, which are uttered constantly while it is on the wing. The other species is the Indian Spur-winged Lapwing (*H. ventralis*) of the Indian peninsula and the Indo-Chinese countries. It is a noisy bird, frequenting the banks of the larger rivers.

Red-wattled Lapwing. — The last of these birds to be noticed is the Red-wattled Lapwing (*Sarcogrammus indicus*), which ranges from Arabia to Persia and through the Indian peninsula to Ceylon. It is distinguished at once by the red lappet or wattle that projects in front of the eye, the general plumage above being brown, glossed with green, bronze, and reddish, the top of the head, throat, and breast being black, and the rump, sides of the head and neck and tail white, the latter crossed by a black band and the wings by a white bar; the length is thirteen inches. It is a familiar and noisy bird, frequenting open spaces near the water, singly, in pairs, or small flocks, its vernacular name, in imitation of its cry, being *Pity-to-do-it*. It is cordially despised by all hunters, as it is constantly giving the alarm to other game. The usually four eggs are deposited after the manner of its relatives in a slight hollow; in color, they are yellowish blotched with brown.

True Plovers. — The true Plovers form a considerable group of "small or medium sized shore-birds, with rather short, somewhat Pigeon-like bill, large rounded head, short neck, long and pointed wings, and moderately lengthened legs, the hind toe usually absent." One of the larger and more widely spread genera is *Ægialitis*, with upward of twenty species. They are small birds, mostly between five and a half and eight inches in length, with a small, rather slender bill, and short tail, the central pair of feathers being brown at the base instead of white, as in the Lapwings, while the plumage of the upper parts is of plain coloration. From the presence of a more or less well defined ring or collar

of black, several of the species are known as Ring Plovers, among them the European Ring Plover (*Æ. hiaticula*) of Europe and western Asia, which retires to Africa and India in winter, and also occurring in Arctic America. They are sociable little birds frequenting the seashore and the margins of lakes and rivers in small parties, or in fall uniting into large flocks, and have a melodious, though rather mournful, whistle. Their food consists of insects, worms, and small crustaceans, and the nest is placed in a hollow in the sand above high water. Smaller but otherwise quite similar is the Little Ring Plover (*Æ. dubia*) of the northern portions of the Eastern Hemisphere, and not far removed is the little Piping Plover (*Æ. meloda*) of the shores of eastern North America, and the Snowy Plover (*Æ. nivosa*) of western North America. The Semipalmated Plover (*Æ. semipalmata*), which is sometimes removed to a separate genus (*Ægials*) on the ground that the outer toe is joined by a web to the middle one, is found throughout North America, nesting in the far north and spending the winter in South America or the West Indies. It is described as a rather silent bird, frequenting, usually in small parties, the salt marshes, sandy beaches, and mud flats, left bare by the receding tide. Another of our species is the Wilson's Plover (*Ægialitis wilsonia*) of the Atlantic and Gulf coasts. It is a gentle, quiet bird, frequenting exclusively the maritime beaches, and having, according to Dr. Coues, a half-whistling, half-chirping note.

Killdeer. — One of the best-known of all North American Plovers is the Killdeer (*Oxyechus vociferus*), which differs from the members of the last genus, with which, however, it is often placed, by the much longer tail, this being nearly two thirds as long as the wing. It is grayish brown above, with the rump ochraceous, the forehead, a stripe over the ear, chin, throat, a collar around the hind neck and the under parts white, while the crown, a neck collar, and a broad breast-band are black; the length is about ten and a half inches. The Killdeer is found throughout the whole of temperate North America, whence it migrates in winter to Central and South America and the West Indies. It is a noisy, restless bird, frequenting pastures, meadows, cultivated fields, and open prairie, often in the vicinity of water, and running rapidly over the ground or taking to swift flight when disturbed. Its peculiar and oft-repeated ringing note, resembling the words *kill-dee, kill-dee*, is heard constantly wherever it is present, often even at night. It is suspicious and constantly on the alert, especially during the breeding season, when it resents all intrusion, and gives voice to loud vociferation. The nest is a mere hollow located in open ground and lined often with a few grass stems; the eggs are the usual four.

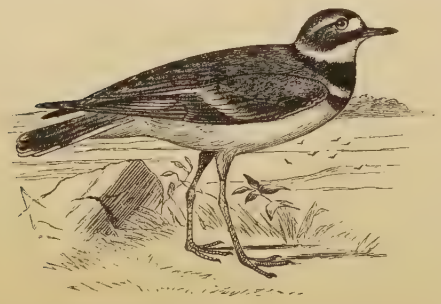


Fig. 118. — Killdeer Plover, *Oxyechus vociferus*.

Golden Plovers. — Another considerable genus of Plovers is *Charadrius*, in which the inner secondaries are very long and pointed, the plumage of the under parts uniform black in the summer dress and the upper parts speckled with golden yellow at all seasons; there is no hind toe. Of these the Golden Plover (*C. apricarius*) is one of the best known. It is a handsome bird, eleven inches in length, with the upper parts grayish black spotted with bright ochre yellow, the black under parts being set off by a white line which runs through the eye and down the neck to the flanks; in winter the under parts are white. It is found in summer throughout Europe and northern Asia and in winter in northern Africa and India; it also breeds in Greenland. It frequents the moors and open places in summer, and in fall unites in flocks, often of some size. It is much esteemed for food and has been so persecuted that in many localities it is now rare or even entirely exterminated. Its habits are those of Plovers in general. The American Golden Plover (*C. dominicus*) is very similar, but has the axillars and under wing-coverts smoky gray instead of white. It breeds in Arctic America and in winter migrates southward over practically the whole of North and South America. A form with relatively shorter wings and with the golden spots of the upper parts larger (*C. d. fulvus*) breeds in northern Asia and Alaska, and goes in winter through India, China, etc., to Australia and Polynesia.

Crook-billed Plover. — We may here mention the remarkable Crook bill Plover (*Anarhynchus frontalis*) of New Zealand, in which the long, slender bill is curved strongly to the right at about two thirds its length from the base. This curious little bird is about eight and a half inches long, cinereous gray above and white below, with a broad white band on the breast and a white forehead. Buller has called attention to the fact that the black pectoral band is far more conspicuous on the right-hand side, since from its peculiar feeding habits there is less necessity for protective coloration on this side. The curved bill, instead of being a deformity or hindrance, as was at first supposed, is found to be of particular assistance in securing its food of insects and worms under stones and pebbles.

The **Dotterels** are another group of small Plovers but with no very strongly marked characters. The word itself is a diminutive of *Dott*, a bird that was so called from its alleged stupidity, and there is a very ancient tradition or fable that the common European Dotterel (*Eudromias morinellus*) when approached by the fowler stretched out a wing or leg as the former reached out an arm or leg, the bird becoming so interested in the imitation that it neglected its own safety and was taken in the net. This no doubt arose from the fact that the bird, which is of a very tame and confiding disposition, has the habit of stretching out a wing and leg before it moves off. It is a handsome, richly colored little bird about nine inches long, the upper parts being ash-brown, many of the feathers margined with rufous, the crown black, with a white band extending from the eye round the nape, while the throat is white, the upper breast ashy, succeeded by a white band on the lower throat, and the breast and flanks bright chestnut, and the abdomen black. Curiously enough the female is larger and more brightly colored than the male. This species is a native of northern Europe and northern Asia, breeding mainly on the cold tundras above the limit of trees, and spending the winter in the

Mediterranean countries and northern Africa. It was formerly abundant in the British Islands and a few may still [illegible] the Lake District, but it is now mainly a migrant there. It frequents especially the bare mountain sides and is one of the tamest of the Plovers.

Avocets. — The Avocets and Stilts form a very well marked group, often separated as a distinct family (*Recurvirostridæ*), and distinguished at once by their large size, excessively long legs, long slender necks, and elongated, awl-shaped bills, with the nostrils within the basal fourth. The hind toe may or may not be present, while the front toes are always more or less webbed. Of the three genera we may first notice the Avocets (*Recurvirostra*), of which there are four species, one each in North America, South America, Europe, and Australia and New Zealand. In these the hind toe, though rudimentary, is present, the front toes are all webbed, and the slender bill decidedly curved upward at the tip. The American Avocet (*R. americana*) is sixteen or seventeen inches long and has the head and neck cinnamon-rufous, the back, tail, and abdomen white, and the scapulars and primaries black, while the other coverts and secondaries are white; in winter the coloration is similar except that the head and neck are white or pearly gray. This species is found in the temperate portions of North America, being rare on the Atlantic coast, nesting from Illinois northward to the Saskatchewan and thence westward, and wintering along the Gulf coast and in Guatemala, Cuba, and Jamaica. It is a very graceful bird, frequenting pools and shallow ponds, and is ordinarily not very wild or suspicious. Regarding its habits we quote from Dr. Coues, who found a colony in some shallow, reedy ponds near the Arkansas River: "They were quite gentle and familiar, and not at all disturbed by my approach, displaying a characteristic of theirs during the breeding season, at least in regions where they are not often molested. They walked leisurely up to the belly in the water, with graceful, deliberate steps, each of which was accompanied with a swaying of the head and neck, as usual with birds of similar form. When approached too closely, they rose lightly from the water, uttering their peculiar cries, flapped leisurely to a little distance, and again alighted to pursue their peaceful search for food, forgetting, at least not heeding, their recent alarm. As they rose from the water, their singular, long legs were suffered to dangle for a few moments, but were

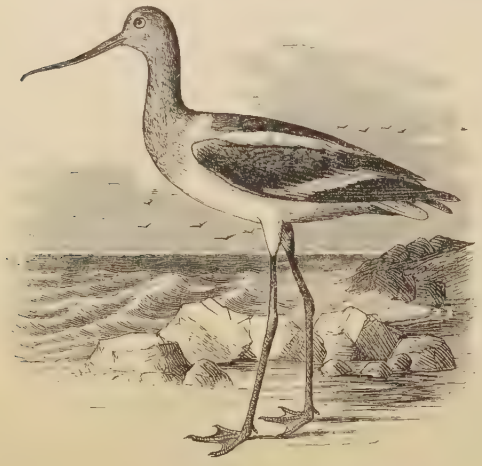


Fig. 119. — American Avocet, *Recurvirostra americana*.

afterward stretched stiffly ba ·d, as a counterpoise to their long necks; and, thus balanced, their lithe bodies were supported with great ease by their ample wings." The nests are placed on the ground in marshy places, often amongst tall grasses, and are composed of a thick bed of old grass stems. The eggs, three or usually four in number, are pale olive or clay-color, thickly spotted with chocolate-brown. The usual tactics are adopted by the old birds to lead an intruder from the nest or very young chicks. The food of the Avocet consists of insects, mollusks, and other small aquatic life, and is secured by moving the head from side to side while the bill is passing through the soft mud.

The **Chilean Avocet** (*R. andina*) of the Andes of Chile is similar to the last, but has no white on the upper parts except on the head, neck, and rump. The Old World species are also somewhat similar, the European *R. avocetta* having the crown black or blackish brown, while in the Australian Red-necked Avocet (*R. novæ-hollandiæ*) the crown is chestnut.

Stilts.—In the Stilts the hind toe is entirely absent. Of the two genera we may first speak of *Cladorhynchus*, in which the bill is perfectly straight and all the toes webbed; it includes only the Banded Stilt (*C. leucocephalus*) of Australia. It is smaller than the Avocets, being only thirteen and a half inches long, and is white throughout except that the wings and center of the abdomen are black and the breast crossed by a broad band of chestnut, which perhaps disappears in winter.

Fig. 120. — Black-necked Stilt, *Himantopus mexicanus*.

In the true Stilts (*Himantopus*), of which there are some six or seven species, there is no web between the inner and middle toes, and the cylindrical or slightly depressed bill is slightly recurved from the middle. The only North American species is the Black-necked Stilt (*H. mexicanus*), which occurs also in tropical America, but breeding northward to the Gulf coast and Great Basin and locally up the Mississippi Valley as far as Minnesota. It is about fifteen inches long, the male being glossy, greenish black above, with the front of the head, a spot above and another below the eye, the rump and under parts pure white; the female is similar, but has the back brownish slate-color; the legs and feet are lake-red or rose-pink. It frequents especially small, shallow, brackish ponds or the upper portions of salt marshes, in which it wades about seeking its food, which consists of small shell-fish, aquatic insects, with the larvæ, eggs, and spawn

of various forms of marine life; it also visits fresh-water ponds in the interior of the country. They are of a sociable disposition, keeping in flocks of a greater of less size, and in contrast to the watchfulness and restlessness of most waders, they are ordinarily of a gentle and unsuspicious nature; contact with man, however, has made them more suspicious. They nest in wet, grassy marshes, making a platform of straw and grass often barely sufficient to keep the eggs out of the water. The eggs number three or four and are similar in color to those of the Avocet. Quite similar to this is the Brazilian Stilt (*H. melanurus*) of South America, which differs in the white of the forehead extending over the crown, and a white collar separating the black of the nape from that of the back. Its habits are similar, as it frequents marshes and lagoons, wading in search of its food in shallow water near the margin. The Black-winged Stilt (*H. himantopus*) of the Old World enjoys a wide range, extending from central and southern Europe over the whole of Africa and eastward through central and southern Asia to China, and southward to India and Ceylon. The male sometimes has the whole head and neck white, but usually the hind crown, nape, and hind neck are more or less black, and the wings deep black, glossed with bottle or purplish green. It is, according to Dresser and others, usually a tame and confiding species, wading about in shallow water for its food of aquatic insects and the like. It nests in May, often in large communities, building its slight, grass-lined nest on masses of floating herbage. Most closely related to this is perhaps the Australian Stilt (*H. leucocephalus*) of Australia, New Guinea, etc.

Ibis-bill. — Of somewhat doubtful affinity though apparently related to the Stilts, is the peculiar monotypic Ibis-bill (*Ibidorhynchus struthersi*) of central Asia, an Ibis-like bird about sixteen inches long, with a hard, long, slender bill much curved downward just beyond the middle. In color it is ashy or brownish gray above and white below, with the front of the head all around blackish brown and the breast marked off by a white-margined black gorget. It is confined in summer to the higher elevations of the Himalayas, sometimes reaching an altitude of 12,000 feet, but coming down in winter nearly to the level of the plains. It frequents the beds of mountain streams, and is usually observed singly or in small, perhaps family, parties of five or six individuals.

Phalaropes. — The graceful and handsome little birds known as Phalaropes may next claim our attention. "Little swimming Sandpipers," Dr. Coues aptly called them, and such they are, being in many ways adapted to strictly aquatic, even pelagic, life, and especially during the winter may often be seen in flocks floating on the ocean many miles from land. They are compactly built birds, between seven and nine inches in length, with short, compressed legs, the tarsus provided with transverse scutellæ both before and behind, while the toes are furnished to the tip as in the Coots with a lateral margin or web, which may or may not be indented at the joints. The bill, in which the lateral groove extends nearly to the tip, is equal to or longer than the head, while the wings are relatively long and the tail short, the plumage of the breast and abdomen being compact and Duck or Gull-like, a provision obviously to keep the cold waters from contact with the body. But these structural features are by

no means the only interesting points connected with these little birds, for, contrary to the conditions prevailing among most birds, the females are not only larger and brighter colored than the males, but they appear to do most of the love making and to permit the duty of nest building and incubation, as well as the care of the young, to fall upon their consorts, being, as Chapman says, "male in all but the prime essentials of sex."

Phalaropes are preëminently birds of the Northern Hemisphere, the three known species being usually placed in separate genera; all are found in, though only one is characteristic of, North America. This is Wilson's Phalarope (*Steganopus tricolor*), the largest species, which may be known by the membrane of the toes being even and unscalloped. In the adult female in summer the top of the head and neck are white, becoming pearl-gray on the back, a black stripe passes through the eye, continuing broadly down each side of the neck and changing gradually on the lower portion to a dark, rich chestnut, which continues backward along each side of the back, while the fore neck and chest are soft, buffy cinnamon, and a stripe above the eyes, chin, cheeks, throat, and lower parts is pure white. In the male at this season the colors are much duller, and in winter both are plain ashy gray above and white below, with the chest and sides of the breast shaded with pale gray. This species is confined in summer to temperate North America, chiefly in the interior, breeding from northern Illinois and Utah northward to the Saskatchewan region, and migrating south in winter to Brazil and Patagonia. Mr. E. W. Nelson has given a very entertaining account of the summer life of this bird as observed in northern Illinois. They arrive from the south the first part of May and by the middle of the month the love making commences. He says: "The only demonstrations I have observed during the pairing time consist of a kind of solemn bowing of the head and body; but sometimes, with the head lowered and thrust forward, they will run back and forth in front of the object of their regard. A male is often accompanied by two females at first, but as soon as his choice is made the rejected bird joins her fortunes with some more impressionable swain. The nesting site is usually in some thin tuft of grass on some level spot, but often in an open place concealed by only a few straggling blades of small sedges. The male scratches a shallow depression in the soft earth, which is usually lined with a thin layer of fragments of old grass blades, upon which the eggs, numbering three or four,

FIG. 121. — Red Phalarope, *Crymophilus fulicarius*.

are deposited about the last of May or the first of June. . . . Incubation is attended to by the male alone. The female, however, keeps near, and is quick to give the alarm upon the approach of danger."

The Northern Phalarope (*Phalaropus lobatus*) is found throughout the northern portions of the Northern Hemisphere, breeding only in the far north, but migrating in winter to the southern oceans. It attains a length of seven or eight inches, the female in summer being slaty gray above and white below, the back being striped with buff, the wing-coverts white-tipped, and the chest and sides of the neck rufous; the male is duller. In winter the plumage is largely white or grayish throughout. Mr. Joseph Grinnell found them nesting abundantly in the Kotzebue Sound region of Alaska, the nest being a neatly molded depression in the sod near pools. The Red or Gray Phalarope (*Crymophilus fulicarius*) is distinguished by its broad, flattened bill, which is somewhat enlarged toward the tip, and by the rich purplish cinnamon-color of the entire lower parts, the winter plumage being largely pearl-gray above and white below. Its distribution is practically the same as that of the last species. During the winter the two last-mentioned forms are found off the coast, never visiting the land unless driven there by storms.

Sandpipers. — We have now come to the advance line of the second of the three subfamilies into which the *Charadriidæ* are here separated, namely, the *Tringinæ*, or Sandpipers, Godwits, etc. It is a large, very widely distributed group containing a large number of genera and species, most of them of small or moderate size, in which the bill is shorter than the tarsus and middle toe, and is straight, or slightly curved upward or downward, while the wings incline to be long and pointed.

In the typical genus (*Tringa*) the bill is stout and straight, and there is a well-developed hind toe. By some systematists *Tringa* is divided into several genera, a view not adopted here. As an example we may first select the Knot, Red-breast, or Robin Snipe (*T. canutus*), as it is variously called. It is about ten and a half inches long, the adult in summer being barred and streaked with black and white and rufous above, the under parts being dull rufous and the abdomen white. The immature plumage is plain brownish gray above, the abdomen white, and the sides and breast more or less barred with black; it requires, it is thought, about four years to acquire the full plumage. The species is found throughout the Northern Hemisphere, breeding within the Arctic Circle and migrating in America to Florida and South America; and if the Old World form be the same, wintering in Africa and from the Indian peninsula to Australia and New Zealand. While with us they are found along the coasts, frequenting the seashores, mud flats, and sandy beaches in flocks, often probing in the soft ground for their food, which consists of small crustaceans, mollusks, worms, and aquatic insects. Forty or fifty years ago, according to Mackay, they were often present at many points along the Atlantic coast during the migrations in countless thousands, but at the present time it is rare that more than fifty or a hundred birds are seen by a single person in a year. Although not of a specially fine flavor, they have always been a favorite with gunners,

as they responded so readily to calling and to the decoys, approaching in compact bunches which often permitted practically the whole flock to be killed by a single discharge. But principally, however, their destruction was accomplished by approaching them on the beach at night with a bright light. "The mode of procedure was for two men to start out after dark at half tide, and one of them to carry a lighted lantern, and the other to reach and seize the birds, bite their necks, and put them into a bag slung over the shoulder." The species is known to breed on the Parry Islands, Grinnell Land, and the Melville peninsula, but details are mainly lacking. Altogether there are about a dozen other species of *Tringa* in various portions of North America, but as the habits of all are quite similar to those of the species described, we may only take space to enumerate several of the more important. Thus the Purple Sandpiper (*T. maritima*) may be known by its brownish gray or ashy breast and fuscous upper tail-coverts; it occurs in northern Europe also; the White-rumped Sandpiper (*T. fuscicollis*) of eastern North America is only seven and a half inches long and has the upper tail-coverts white; in western North America the last is replaced by the Baird's Sandpiper (*T. bairdii*), which it much resembles, but may be separated by the fuscous instead of white upper tail-coverts; closely related to the last two but of larger size (nine inches long) is the Pectoral Sandpiper, Krieker, or Grass-Snipe (*T. maculata*), which is found more in wet meadows than along the seashore; the final American form to be noticed is the Red-backed Sandpiper (*T. alpina sakhalina*), which has a slightly curved bill. This is the American representative of the well-known Dunlin (*T. alpina*) of northern Europe and northern Asia, which is exceedingly abundant along the English coasts during the migrations, sometimes coming in such numbers as to resemble "the smoke from the funnel of a steamer." Smallest of all is the Least Sandpiper, or Little Stint (*T. minuta*), which is only six inches in length; it is a native of northern Europe.

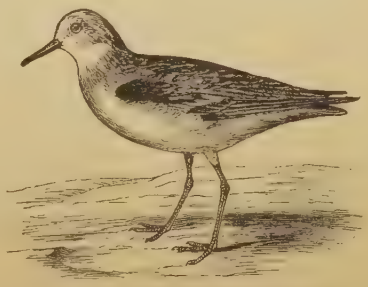


Fig. 122. — Sanderling, *Calidris leucophæa*.

Sanderling. — Quite closely related to the last genus, but lacking the hind toe, is the little Sanderling (*Calidris leucophæa*), the sole representative of its genus. It is rusty, spotted with blackish above and white below, though there is considerable variety in the plumage at different seasons; it is seven or eight inches in length. It breeds in the Arctic regions, but during the remainder of the year it wanders far and wide along the coasts, reaching the extremity of South America, Africa, and even Australia, and the Marshall Islands.

Spoon-billed Sandpiper. — One of the most curious members of the group is the diminutive Spoon-billed Sandpiper (*Eurynorhynchus pygmæus*), so called from the fact that the bill is widely expanded and spoon-shaped at the tip, the width of the flattened portion being nearly half an inch. The plumage

is blackish, the feathers margined with rufous above, with the sides of the head, neck, and breast rusty red, while the remaining under parts are white, the lower breast black-spotted; its length is but six inches. Beyond the fact that it is found in company with other Sandpipers along muddy beaches where it secures its food, very little is known of its habits; its nest and eggs are unknown.

Godwits. — With a long, slender, very gently recurved bill, which is much longer than the tarsus and entirely smooth and hard at the tip, is a little group of some half a dozen species known as the Godwits (*Limosa*), which are in some respects related to those last mentioned. As further distinguishing marks it may be noted that the bill is grooved nearly to the tip, while the gape is relatively slight, in fact not extending beyond the base of the culmen, while the feathers on the side of the bill reach forward to about the same point, or a little farther on the chin. The tibia is partially bare and the middle or outer toes connected by a membrane for a short distance; the wings are long and pointed, equaling or slightly exceeding the short, even tail. In several the seasonal difference in coloration is considerable; in all the length is between fifteen and twenty inches.

Of the four North American forms the Marbled Godwit or Brown Marlin (*L. fedoa*), may be known by having the upper tail-coverts pale cinnamon barred with black, and the axillaries and under wing-coverts cinnamon-rufous; it is about eighteen inches long. It is found throughout North America in general, though rare on the Atlantic coast, breeding from Iowa and Dakota northward to Alaska, and in winter migrating to Guatemala, Yucatan, and Cuba. According to Colonel Goss, " this bird inhabits the salt and fresh water shores, marshes, and moist ground upon the prairies. It feeds upon crustaceæ, insects, worms, larvæ, etc., moving about in a horizontal position, picking and probing as it goes. Its flight is easy and well sustained, though not very rapid; in alighting it raises the wings over the back as it touches the ground. These birds as a rule are shy and keep well out of reach." The eggs are clay-colored or ashy, spotted, blotched, and scrawled with brown. Allied to this, but distinguished at once by the white, dusky-spotted upper tail-coverts, axillars, and under wing-coverts is the Bar-tailed Godwit (*L. lapponica*) of the northern portion of the Eastern Hemisphere in summer, but wintering in the Mediterranean countries. It frequents the seashore, estuaries, and mud flats, where it probes in the mud and sand for its food of crustaceans, worms, etc. It nests in the interior of Lapland. In eastern Asia and adjacent Alaska its place is taken by the Pacific Godwit (*L. l. baueri*), known by its paler coloration and more spotted rump; its habits, however, are similar. In North America east of the Rocky Mountains occurs the Hudsonian Godwit (*L. hæmastica*), which may be known by its uniform black instead of barred tail. This bird makes one of the longest migratory journeys on record, since it rears its young within the Arctic Circle and in winter ranges throughout the whole length of South America. Its Old World counterpart is the Black-tailed Godwit (*L. limosa*), distinguished by the two white patches on the wing. It is found in central and northern Europe and is accidental in Greenland.

Other Sandpipers. — Agreeing with the Godwits, at least as regards the hard point of the bill, is another considerable genus of Sandpipers (*Totanus*), which, however, may be distinguished by their generally smaller size, non-webbed inner and middle toes, less grooved bill, and gape extending decidedly behind the base of the culmen. In coloration the plumage is plain grayish or brownish above, more or less streaked with white or dusky, and white somewhat streaked or spotted with dusky below. As here considered, *Totanus* embraces nearly a dozen forms, but by others it is divided into some three or four genera; it is clearly an ancient type, as no less than five more or less satisfactory forms have been described from the lower Miocene or later.

The **Greenshank** (*Totanus* [or *Glottis*] *nebularius*) is a well-known bird of the Eastern Hemisphere, spending the summer in northern Europe and northern Asia, and wintering far to the south, even reaching Australia, and accidentally eastern North America. It is about fourteen inches long and may be known by the pure white rump and lower back and olive-green legs and feet, whence, of course, its common name. It is a rather shy, noisy bird, frequenting both the seashore and the inland waters, often in company with its close relative, the Redshank, and feeding on insects, worms, etc. It is often found far from water, and in such situations frequently makes its nest, a mere depression in the sand and lined with a few grass stems. The Redshank (*T. calidris*) of Europe and central Asia to eastern Siberia is of smaller size, being only eleven inches long, and has the legs and feet orange-red; the female is slightly larger than the male. It is also a shy, wary bird, congregating in large, noisy flocks in winter along the coasts, but during the nesting season it is often found in marshy places more inland. Distinguished by the larger size and barred instead of white secondaries is the Spotted Redshank (*T. fuscus*) of northern Europe and Asia north to Kamchatka; its habits are similar to those of its relatives. Ranging over the whole of North America, but breeding only or mainly far north, is the Greater Yellow-legs (*T. melanoleucus*), a bird about fourteen inches long, and agreeing with it essentially in all save size is the Yellow-legs (*T. flavipes*), with a total length of less than eleven inches; in both the legs are yellow in life. They are found mainly along the coasts during the winter, but in summer frequent the inland waters. Another typical New World species is the Solitary Sandpiper (*T. solitarius*) of temperate North America in summer, whence it ranges to tropical America in general for the winter. It is a so-called Wood Sandpiper, being rather rarely found along the coasts, but keeping mainly about the lakes, ponds, and streams of the interior, often in the vicinity of human habitations. "When surprised it utters a sharp, whistling note, raises its wings, and runs nimbly over the miry ground. If closely pursued, it retreats to the opposite side of the pond, arranges its feathers, and soon resumes its usual gentle manners." Its nest and eggs remained long unknown, though from its close affinity with the Green Sandpiper, the habits of which are mentioned below, Mr. Ridgway and others have suggested that its nesting habits may also be similar, and such apparently proves to be the case, since Mr. Walter Raine has recently (1904) recorded the finding of three sets of four eggs each in northern

Alberta. The first set was placed in an old nest of the Robin, at a height of fifteen feet, the second in the nest of a Bronzed Grackle and in a low tree, and the third in a Cedar Waxwing's nest only five feet from the water by which the tree was surrounded: all were in or near wet swamps. According to Raine, the eggs are quite unlike those of any other American Sandpiper, being pale greenish white rather thickly spotted, especially at the larger end, with purple brown, vandyke brown, and purplish gray; the average size is 1.36 by .99 inch. Very like the last in appearance, but having the upper tail-coverts pure white instead of dusky barred with white, is the Green Sandpiper (*T. ochropus*) of northern Europe and Asia, which is chiefly remarkable on account of its peculiar nesting habits. Instead of building the usual rude nest on the ground, it places its four handsome eggs in the deserted nests of other birds, such as Thrushes, Blackbirds, and Jays, often at a considerable height from the ground, though usually not far from a pond or other body of fresh water.

Willet. — Closely related to the last genus, but distinguished by having the inner and middle, as well as the middle and outer, toes webbed, is the genus *Catoptrophorus*, including only the monotypic North American Willet (*C. semipalmatus*), which is so called from its continuously repeated alarm cry of *pilly-will-willet, pilly-will-willet.* They are large birds, from fifteen to seventeen inches long, brownish gray barred with dusky above and white below, the fore neck streaked, and the breast and sides heavily barred or spotted with dusky; there is also a conspicuous white wing patch. In the winter plumage the upper parts are unmarked brownish gray and the lower parts immaculate white. The western form (*C. s. inornatus*), separated on the basis of its slightly larger size and paler, less heavily marked summer plumage, is confined to the western United States, breeding from Texas to Manitoba, and spending the winter mainly along the Gulf coast. The Willets are found in flocks in the vicinity of both salt and fresh water, but especially the salt marshes and shoals, where they may often be seen wading about in the shallow water. They are shy, watchful birds, not easily decoyed, and enjoying a swift, graceful flight, which is made conspicuous by the white wing patches. If the nest is approached, the birds fly wildly about or hover over the intruder, " vociferating with great violence," and at times they become a great nuisance to sportsmen from giving the alarm to all birds within

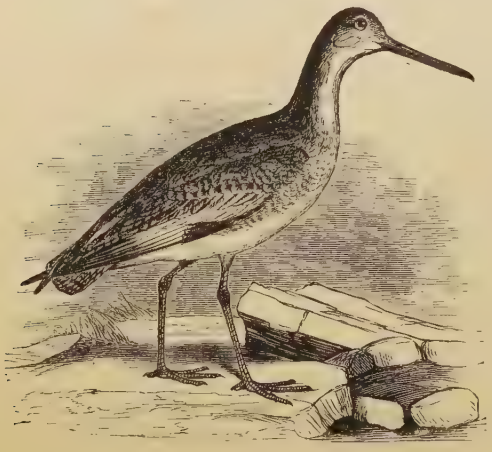


FIG. 123. — Willet, *Catoptrophorus semipalmatus.*

hearing distance. The eggs, usually four in number, are deep drab, thickly spotted with chocolate.

Ruff. — Perhaps the most remarkable member of this entire group is the Ruff (*Pavoncella pugnax*) of temperate Europe and Asia, whence it wanders in winter to Africa, the Indian peninsula, and the Malay Archipelago, very frequently reaching eastern North America. It is related to, and in several respects suggests, our Bartramian Sandpiper, or Upland Plover, but is distinguished at once by the fact that the male assumes during the breeding season a peculiar "cape" or shield-like ruff of feathers on the neck and a tuft of long feathers on the sides of the head, and the face is covered with reddish or yellowish caruncles. While this ruff is similar in shape in all mature birds, its color varies greatly, hardly two being exactly alike in this respect. The extremes of color are pure white and intense purple-black, between which are "buffs, reds, chestnuts, browns of many shades, and mottled black or brown and white, often beautifully streaked, or barred, or spotted, or delicately vermiculated." — Hudson. The general plumage at this time is mottled above with black, buff, and gray, with a great degree of individual variation. The males are about twelve inches long, while the females, or Reeves, as they are called, are two inches shorter and lack the cape or ruff and resemble in coloration the immature males and the males in winter plumage, being barred with blackish, buff, white, and rusty, the lower parts being mostly immaculate white. In addition to the remarkable feather ornaments the males, unlike any other members of the group, are polygamous; being greatly exceeded in numbers by the females, for whose favors they engage in fierce battles, resorting for the purpose to especially selected "hills." In these battles, which usually take place early in the morning, the birds stand facing each other with ruffs erected and thrust at each other with their long, sharp bills; usually, however, though appearing very fierce, little damage is done in the duels. These birds were formerly very abundant in the British Islands, but immense numbers were netted for market during the breeding season and it has now become solely a bird of passage there, resorting to the northern lands for breeding purposes.

Fig. 124. — Ruff, *Pavoncella pugnax*.

Upland Plover. — The Bartramian Sandpiper, or Upland Plover (*Bartramia longicauda*), above alluded to, is one of the most characteristic members of the order in eastern and central North America east of the Great Basin, though extending as far north as the Yukon Valley and Nova Scotia. It is about twelve inches long, light brownish above, barred and spotted with blackish, blackish on the crown, and buffy streaked with dusky on the head and neck, while the

throat and belly are dull whitish or very pale buff; the outer primary is white-barred. The habits of this bird are peculiar for a so-called wader, since it appears rather to shun water and to spend its life mainly on open prairies, meadows, and pastures, where its plumage so harmonizes with the surroundings that it cannot be detected at a little distance. It is a rather shy bird, difficult to approach closely, and is observed singly or in pairs in summer, though in winter it congregates in some parts of its range in considerable flocks. It feeds on insects of various kinds, running over the ground with great rapidity, and when pushed to flight using its wings with effective effort. As it alights it has the habit of stretching its wings high over the back before settling them in place. It has various notes, such as a soft, double-noted whistle uttered when it is flushed, and a "song" which Langille calls a "prolonged, mournful, mellow whistle, more like the whistling of wind than a bird's voice."

Tip-up. — The familiar little Spotted Sandpiper, Tip-up, or Peet-weet (*Actitis macularia*) of temperate North America is almost too well known to need extended description. Briefly it may be described as seven and a half or eight inches long, with long, pointed wings and a rather short, rounded tail, the color above being a brownish olive-green with a metallic or bronzy luster, marked with numerous lines and irregular spots of brownish black, a line over the eye and the entire under parts being white covered with numerous round and oval spots of brownish black; the wings are brown with a greenish luster and considerable white. While this species is found to some extent along the coasts, it is very generally distributed throughout the country in summer, hardly a lake, pond, or stream being without its pairs of Tip-ups. When startled it flies to a short distance, generally across the small stream, uttering its plaintive *peet-weet, peet-weet*, and nervously teetering up and down and flirting the tail, or running swiftly along the shore. A certain territory along shores or streams appears to be allotted to an individual or pair, much as the Dippers divide up their haunts, and after one is urged to several short flights which apparently take it to the border of its domain, it doubles back to the starting point.

Curlews and Whimbrels. — The last members of this group that we shall have space to mention are the Curlews and Whimbrels (*Numenius*), of which there are some nine or ten living and some five or six fossil forms known. They are among the largest of the group, some exceeding two feet in length, with the long legs covered in front with transverse scutella and on the sides and back with small, hexagonal scales, while the very long bill is strongly arched or decurved for the terminal half, the wing being of moderate length and pointed, and the tail rather short and squared. The plumage is largely of a spotted and mottled brown and buff. Four species inhabit North America, a fifth occurring accidentally in Greenland, among the best-known being the Long-billed Curlew (*N. americanus*), which ranges throughout the whole of North America. It is our largest species, ranging from twenty to twenty-six inches, and may otherwise be distinguished by the rusty cinnamon-colored secondaries and quills, and the deep cinnamon, unbarred axillaries. They frequent marshy and muddy shores of lakes and ponds, but are by no means confined to these locations, being often observed on exten-

sive dry plains and prairies remote from water. They feed on mollusks, insects of various kinds, worms, crustaceans, and crayfish, which they secure by probing with their long bills, and in fall they frequently feed on berries, then becoming very fat and considered excellent eating. Their loud, prolonged whistling note is very commonly heard during the breeding season. The Hudsonian Curlew (*N. hudsonicus*) is smaller, being only seventeen or eighteen inches long, and may be known by the dusky brown wings and the crown with two broad, lateral stripes of brownish dusky, enclosing a narrower middle stripe of buffy. This species is also found over the whole of North America, but breeds only in the Arctic regions, and winters from the Gulf States to the southern extremity of South America. It keeps more to the coasts during its migrations, but in general resembles the others in habits; its call note, however, is quite distinct. The smallest of our species is the Eskimo Curlew (*N. borealis*), which has a total length of only thirteen or fourteen inches. It is similar in coloration to the last, but has the crown streaked with dusky and lacks the lighter median stripe. It is found in northern and eastern North America, but breeding only far northward. They were observed abundantly in Labrador by Dr. Coues, who says they associate in "flocks of every size, from three to as many thousands, but generally flies in a loose, straggling manner. Their flight is firm, direct, very swift, when necessary much protracted, and is performed with regular, rapid beats. They never sail, except when about to alight; as their feet touch the ground, their long, pointed wings are raised over their back, until the tips almost touch, and then deliberately folded. Their note is an often-repeated, soft, mellow, though clear, whistle, which may be easily imitated." He found them feeding almost entirely on the crow-berry (*Empetrum*), which grows on the hills in the greatest profusion. According to Mr. William Brewster, there is reason to believe that the Eskimo Curlew is now extinct. The only other American species is the Bristle-thighed Curlew (*N. tahitiensis*), so called from the fact that the thighs are provided with numerous elongated bristles which project far beyond the tips of the feathers. It is confined to the northwest coasts of North America and the Pacific Islands.

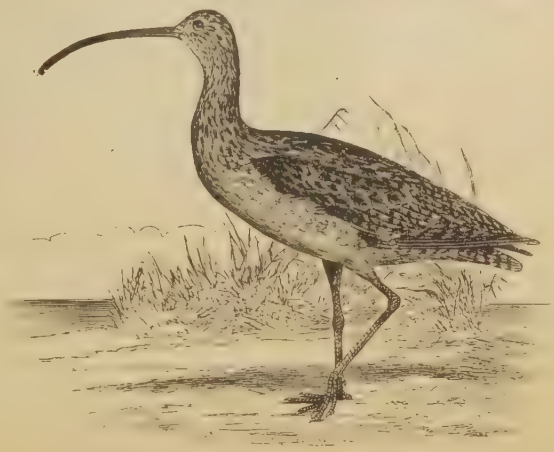


Fig. 125. — Long-billed Curlew, *Numenius americanus*.

The Old World Whimbrel (*N. phæopus*), which as already stated occurs in Greenland, whereby it comes to be regarded as a North American bird, is similar to the Hudsonian Curlew, but is only seventeen inches in length and has a white rump, which none of the other American species have. It is found throughout Europe generally, its place in eastern Asia, Japan, Korea, etc., being taken by the closely allied Variegated Whimbrel (*N. variegatus*). Their habits are those of Curlews in general.

European Woodcock. — The Woodcock and Snipe with their allies comprise the final subfamily here recognized (*Scolopacinæ*), and may be known by the very long bill which is swollen and somewhat thickened at the tip, which is soft and very sensitive, an adaptation for securing their food by probing in the mud. As a typical example of the group we may select the European Woodcock (*Sclopax rusticula*), in which the tibia is completely feathered and the straight bill is longer than the tarsus and middle toe combined. It has a very robust body with a rather short, rounded tail, and a long, pointed wing in which the outermost primary is longest and broad like the rest, a character which serves to separate it at once from the American Woodcock. In coloration it is rusty brown above, everywhere barred and vermiculated with black, and wood-brown barred with darker brown below; the sexes are alike in plumage. The length is about fourteen inches. The Woodcock has large dark eyes and is mainly nocturnal in its habits, remaining in concealment in thick brush and brake during the daytime, even, it is said, partially covering itself under dry leaves, its tawny, vermiculated plumage serving admirably for concealing it. When disturbed during the day it flies in an Owl-like manner and seems hardly to know which way to go, but on the approach of dusk it becomes active, flying irregularly but rapidly this way and that through the glades, seeking its feeding places. Its food consists of worms, larvæ, etc., which occur in moist, swampy, or boggy ground, and which it dexterously extracts with its long, sensitively tipped bill. It is largely a migrant species, spending the winter in the Indian peninsula, China, and neighboring regions, and in summer spreading over much of Europe, northern Asia, and the Himalayas. It breeds mainly to the northward, though a limited number remain for the purpose in the British Islands. During the love-making season the male, abandoning his usual shy habits, may be seen at morning and evening flying slowly about with the plumage puffed out, and emitting the while two peculiar notes. The nest is a slight hollow scratched in the ground in some secluded situation among ferns and bushes, and the eggs are four in number, of a pale yellowish white, spotted and blotched at the larger end with reddish brown. It was long ago observed that when the young birds were threatened with danger they were removed one at a time by the mother to a place of safety. It was first asserted that they were carried in the bill or in the claws, but neither seemed fitted for this office, and it appears that they are carried between the thighs, the bill being employed to hold them in place. The Woodcock is one of the most highly prized of European game birds and is much sought after by sportsmen and epicures, with the result that the numbers have become sadly depleted. A much smaller, darker species (*S. saturata*) occurs in Java and New Guinea.

American Woodcock. — Closely allied to the last is the well known American Woodcock (*Philohela minor*), which differs from its Old World relative in having short, rounded wings in which the three outer primaries are very narrow and attenuated, the fourth and fifth quills being equal and longest. It has the same full, compact body, long bill, and large head and eyes, for it, too, is mainly nocturnal in its habits. The plumage above is variegated with pale ashy, rufous, or yellowish red of various shades and black, the front of the crown being slaty buff, with three transverse bands of black alternating with three of yellowish rufous on the back of the head, and an indistinct black band from the eye to the bill, while the under parts are a pale grayish rufous; the length is about eleven inches.

Although the Woodcock is found throughout most of the eastern United States, its true home is in the Mississippi Valley and the northern and middle tiers of states, where it finds extensive feeding grounds such as alder swamps, marshy ground along streams, and fields of growing corn. Its food consists almost entirely of earthworms and its requirements are so great that a bird weighing only six ounces has been known to devour at least half a pound of worms in twenty-four hours. It is mainly nocturnal, remaining concealed during the brighter parts of the day, though sometimes it may feed during dark weather or when in very close, thick cover, but when dusk comes it is all activity, and it leaves its hiding place for the feeding grounds in marsh or field. Its flight is somewhat variable both in force and swiftness, as when flushed it sometimes rises in a labored, irregular manner, but at others it is off with a swiftness that taxes the marksmanship to the utmost. The Woodcock is an early migrant, returning from its winter home in the South Atlantic and Gulf States to the latitude of New York by March first, and the nesting season is also early, eggs having been noted in Florida in the first part of February, and even in the most northern part of its range the young are out by or before June. The period of incubation has recently been determined by Dr. Paul Bartsch to be about thirty days.

FIG. 126. — American Woodcock, *Philohela minor*.

Snipe. — In the typical Snipe (*Gallinago*), which are also sometimes referred to *Scolopax*, the lower portion of the tibia is nearly or quite bare of feathers, and the body is more slender and the legs relatively longer, while the number of tail-feathers varies from twelve to twenty-four. Another character serving to separate them from the Woodcocks is afforded by the longitudinal instead of transverse black markings on the head. Of the twenty-three forms now referred to this genus, North America lays claim to but one, the Wilson's Snipe (*G. delicata*),

though the closely related European Snipe (*G. gallinago*) is of frequent occurrence in Greenland. Seven or eight species are found in South America, while the remainder are widely spread throughout the Old World.

The **Wilson's Snipe**, which is spread throughout the whole of North and middle America and the West Indies, but breeding only northward from the northern parts of the United States, is a bird about eleven inches in length, with the entire upper parts brownish black, barred, mottled, and bordered with various shades of cream-buff, while the throat is white, the neck and breast buff, indistinctly streaked with brownish, and the abdomen white, sharply barred with slate-color; the number of tail-feathers is usually sixteen. This species mainly frequents low, wet meadows and boggy grounds, occasionally resorting to wet swales and springy thickets, but only rarely visiting the salt marshes. When flushed it rises from the ground with astonishing swiftness, uttering a series of hoarse *scaipes*, and goes off with an exceedingly swift but erratic and tortuous flight for a distance of some twenty yards, when its flight becomes more steady. It is very difficult to shoot on the wing, requiring experienced marksmanship and steady nerves, for one never knows which way it will turn. Although not quite so nocturnal in its habits as the Woodcock, it is mainly active at night or in dark weather, and secures its food by probing in the soft ground. During the mating season it indulges in a series of aërial gymnastics, sometimes called "drumming" or "bleating," an account of which we quote from Mr. Joseph Grinnell, who observed them in the Kowak Valley, Alaska. He was first attracted by a curious, far-off song, which he finally traced to a bird high up in the sky. "It was flying slowly in a broad circle with a diameter of perhaps 600 yards. This lofty flight was not continuously on the same level, but consisted of a series of lengthy undulations or swoops. At the end of each swoop the bird would mount up to its former level. The drop at the downward dive was with partly closed quivering wings, but the succeeding rise was accomplished by a succession of rapid wing beats. The peculiar resonant song was a rolling series of syllables uttered during the downward swoop. This curious song flight was kept up for fifteen minutes, ending with a downward dash. But before the bird reached the ground, and was yet some twenty yards above it, there was apparently a complete collapse. The bird dropped, as if shot, for several feet, but abruptly recovered itself to fly a short distance farther and repeat this new maneuver. By a succession of these collapses, falls, recoveries, and short flights, the acrobatically inclined bird finally reached the ground." The nest is the usual simple hollow in the ground, and is generally lined with a few grass blades or leaves; the eggs are four in number, and the color olive-brown or grayish drab, thickly spotted, mostly at the larger end, with chocolate. The flesh of the Wilson's Snipe is excellent eating, and it is in high favor with sportsmen, not only on this account, but from the skill required in securing it.

The **European Snipe** (*G. gallinago*) above mentioned is almost exactly similar in coloration to the Wilson's, but may be distinguished by a tail of usually fourteen feathers and the much longer bill. It is widely spread throughout Europe and northern Asia, wintering in northeastern Africa and the Indian coun-

tries. Its habits are similar to those of its American cousin, including the production of the sounds likened to the bleating of a kid, drumming, etc., though its flight is, perhaps, not quite so erratic when flushed.

Other Species. — Of the other Old World species, mention may be made of the Wood Snipe (*G. nemoricola*) of the Indian peninsula and Assam, which is a little larger and duller colored than the last, but is otherwise quite similar. It is described as a solitary bird, frequenting swampy localities, often in the Himalayas ascending to from 8000 to 12,000 feet altitude. The Pin-tailed Snipe (*G. stenura*), which breeds in eastern Siberia and migrates in winter to the Indian peninsula, China, and the Moluccas, is distinguished at once by possessing a tail of twenty-six feathers, of which eight on either side are narrow, stiff, and shorter than the others; its colors are quite like those of the common European species (*G. gallinago*). Smallest of all is the little Jack Snipe (*G. gallinula*), which is sometimes placed in a genus by itself (*Limnocryptes*), and which may be known by a length of seven and a half or eight inches and a tail of twelve soft, pointed feathers. This bird breeds in the northern part of Europe and Asia, mainly north of the Arctic Circle, and winters far south. Of the group of South American species the Paraguay Snipe (*G. paraguayæ*) may serve as the example. About ten and a half inches long, brown, striped and barred with black and fulvous above, and white, marbled with dusky and brown below, it is an abundant and resident species in the Plata district, breeding in the midst of great marshes, but as soon as the young are able to fly returning again to the more open, wet country, where they sometimes congregate in flocks of many hundreds. They are then very wild and difficult of approach. It has the habit of performing aërial evolutions similar to those described for the Wilson's Snipe, and Mr. Hudson says that the "singular grinding sounds caused by their feathers in their violent descent from a great height become distinctly audible at a distance of a mile." Brazil and Paraguay is the home of the Giant Snipe (*G. gigantea*), the largest of the Snipes, which attains a length of nineteen inches.

Dowitchers. — With a well-developed web at the base between the front toes, but otherwise quite well agreeing with the species of *Gallinago*, are the Dowitchers (*Macrorhamphus*), of which three species are recognized. The best-known form is the Common Dowitcher (*M. griseus*) of eastern North America, which breeds within the Arctic Circle and spends the winter from Florida to South America. It attains a length of ten or eleven inches, the summer plumage being largely black above with the feathers edged or barred with rufous or buff, the tail and its coverts being white, barred with blackish, while the lower parts are pale rufous, becoming whitish on the abdomen and more or less barred or spotted with black. In winter nearly the whole plumage is ashy gray, somewhat intermixed with whitish, the abdomen being usually unspotted white. The bill, it may be added, is flattened, expanded, and somewhat corrugated at the end. The Dowitchers, Red-breasted, or Gray Snipe, as they are variously called, are shore or bay birds, frequenting often in large flocks the bars and mud flats exposed by the receding tide. They move in compact flocks, and answering readily to the decoys are frequently decimated by the gunner who lies in wait. Dis-

tinguished by its larger size, much longer bill, and brighter color is the Long-billed Dowitcher (*M. scolopaceus*), chiefly of the interior and western provinces of North America from Alaska to Mexico, while on the Asiatic side the place is taken by the still larger *M. taczanowskii*, which breeds in eastern Siberia and in winter visits the Burmese countries.

THE SHEATH-BILLS

(Family *Chionididæ*)

On the extreme southern portions of South America and the adjacent islands, and on the farther Antarctic islands, are found four species of snow-white, Pigeon-like birds known as Sheath-bills, the name being derived from the remarkable saddle-shaped, horny sheath which encircles the base of the upper mandible and partially conceals the circular (holorhinal) nostrils. There have been many differences of opinion as to the probable relationship of these birds, but after a careful and complete dissection of the Kerguelen Island form, Drs. Kidder and Coues conclude that they are "a connecting link, closing the narrow gap between the Plovers and Gulls of the present day," and in their opinion "represent the survivors of an ancestral type from which both Gulls and Plovers have descended." On the whole, however, their affinities seem to be rather more with the *Charadriidæ*, and they are appropriately placed next to them. As additional characters it may be mentioned that the Sheath-bills are four-toed birds, the anterior toes not being webbed, though there is a slight membrane between the base of the inner and outer toes; the tarsus is reticulated both before and behind and on the carpus there is a curious spur, the use of which is conjectural, as it does not appear to be employed in fighting. The Sheath-bills were formerly very rare in collections, which in a measure accounts for the uncertainty long existing regarding their relationship.

Fig. 127. — Lesser Sheath-bill, *Chionis minor*.

The four species are placed in two genera, the oldest known being *Chionis*, in which the face is bare and carunculated about the base of the bill. The oldest and best-known species (*C. alba*), which makes its home about the southern

extremity of South America, attains a length of fifteen inches, and, as stated above, is snowy white throughout, with the bill and feet black or bluish dusky and the base of the mandibles yellowish. In 1904 an additional species (*C. nasicornis*) was described by Reichenow from Heard Island. In the second genus (*Chionarchus*) the face is bare in front but not below the eye and the caruncles are absent from the base of the bill. Of the two species in this genus we possess the most information concerning the Lesser Sheath-bill (*C. minor*) of Kerguelen Island and the Marion and Prince Edward islands. Although called the lesser it is really larger than the first-mentioned species, being fifteen and one half inches long; the bill is black and the feet flesh-tinted, the plumage being uniformly pure white, and very soft and downy. When Kerguelen Island was visited by the Transit of Venus parties in 1874-1875, the Sheath-bill, or "White Paddy" of the whalers, was found to be abundant and so perfectly fearless as to be often taken in the hands. "It bears," says Dr. Kidder, "a strong resemblance to the Pigeons in form and mode of flight; it is easily domesticated, remarkably fearless of man, dislikes water, cannot swim, is largely a vegetable feeder, and its usual note is a harsh croak." On one occasion he observed a number on the rocks and walked toward them. "They would scarcely get out of my way, seeming greatly interested in my movements, and when I sat on a stone, keeping perfectly still, the whole party, twelve in all, came up to examine the intruder. They walked all around me, coming almost within reach; others flying up from more distant rocks to join them, and finally stopping, almost in a semicircle, for a good stare." Their food he found to consist very largely of soft green seaweeds, which they stripped up with their bills, with occasional mussels and crustaceans; they also greedily devoured the eggs of various birds. Their own eggs, one to three in number, were placed in a carefully concealed nest of grasses in holes among or behind rocks. The remaining species (*C. crozettensis*) from the Crozette Islands is similar but smaller, with a smaller bill and darker feet.

THE CRAB-PLOVERS

(Family *Dromadidæ*)

The monotypic Crab-Plover (*Dromas ardeola*), so called from its feeding chiefly on crabs, is a very peculiar and quite Tern-like bird about sixteen inches long, with a strong, compressed, ungrooved bill which is longer than the head and has the oval nostrils at its base. The wings are long and pointed and the tail nearly even, while the tarsi are long and the toes long and much webbed, the middle claw being dilated on the inner side and more or less notched. With the exception of the upper back, the long, interscapular plumes and greater coverts, as well as portions of the webs of the quills which are black, the entire plumage is white. The Crab-Plover inhabits the coasts of the Red Sea and Indian Ocean, frequenting seashores or margins of salt lakes, and usually going about in

small or large flocks. It is an active bird, running about swiftly and flying well; its note is described as a low, rather musical call. The nesting habits are peculiar in that the single, very large, pure white egg is laid at the end of a hole dug by the bird itself in sand near the shore. According to Blanford, the hole is dug "obliquely in the form of a bow curving up toward the end, which is about four feet from the entrance; there is no lining." The egg measures about two and fifty-four hundredths by one and seventy-seven hundredths inches.

There has been much discussion as to the proper systematic position of this bird, some regarding it as an aberrant Tern, others as allied to the Oyster-catchers, while Gadow places it under the preceding family. It seems, however, sufficiently distinct to merit being placed in a distinct family.

THE PRATINCOLES AND COURSERS

(Family *Glareolidæ*)

There has been brought together within the confines of this family, under the name of Pratincoles and Coursers, a number of peculiar Old World birds concerning the systematic position of which there have been some decided differences of opinion, and even now not all of the questions can be regarded as definitely settled. In any event, the birds here included agree among themselves in wanting the basipterygoid processes at the base of the skull, a character which serves to separate them from all the other members of the order. With the exception of the Black-backed Courser (*Pluvianus*), if this is to be included here, all agree in having slit-like (schizorhinal) nostrils and the split (schizognathous) form of the palate, while the tarsus is transversely scaled in front. They are separated into two well-marked groups or subfamilies, to the first of which (the *Glareolinæ*) belong the Pratincoles, of which there are ten species, placed under three genera or by some under a single genus.

The typical Pratincoles (*Glareola*) are small birds with very long, pointed wings and a rather long, very deeply forked tail, the latter a unique feature among the Plover-like birds and the one doubtless which induced Linnæus to place them among the Swallows. As additional to these characters it may be mentioned that they possess four toes, the outer and middle one being united by a short web, while the middle toe is provided with a distinct, comb-like claw, on which account, apparently, they were presumed by Richenow to be related to the Goatsuckers.

The Common or Collared Pratincole (*G. pratincola*) of the warmer parts of Europe, Asia, and Africa is about nine inches long, brown with an olive tinge above, the wings blackish with the secondaries white-tipped, and a blackish tail which is white at the base, while the breast and flanks are grayish brown, and the remainder of the under parts white. There is a black line under the eye and around the throat where it forms a shield, and the under wing-coverts and

axillaries are chestnut-red. From eastern Siberia and as far south as Australia its place is filled by the Indian Pratincole, or Swallow Plover (*G. orientalis*), which differs slightly in color and has a less deeply forked tail, while in southeastern Europe in summer and Africa in winter occurs Nordmann's Pratincole (*G. melanoptera*), which is well marked by having the under wing coverts and axillaries jet-black. In Africa it is attendant upon the swarms of locusts and is known to the colonists as the Locust-bird.

The Pratincoles all have similar habits, going usually in flocks of greater or less size and frequenting open, flat ground such as the sandy beds of large rivers, sandy plains, and desert places in the vicinity of water. As a rule they rest on the sand during the middle of the day, becoming active in the morning and evening, when they hawk back and forth for insects "like a gigantic Swallow,"

Fig. 128. — Australian Pratincole, *Stiltia isabella*.

now high up in the air, now just skimming the surface of the ground, or wheeling and darting about in a surprisingly active manner. They are, however, equally at home on the ground on which they run with ease and swiftness, notwithstanding the rather short legs. Their food consists of moths, beetles, flies, grasshoppers, and other insects, the larger proportion being taken on the wing. The note of the common species, Mr. Dresser says, is a shrill whistle, *kia, kia*, usually uttered on the wing. They make no nest, but deposit the two or three large eggs in a slight depression on the bare sand.

Differing from the last merely in having the tail emarginate or nearly square are the Pratincoles of the genus *Galactochrysea*, of which five are found in Africa and one in the Indian peninsula and Ceylon. On the ground of a much longer tarsus and a lengthened and attenuated first primary the Australian Pratincole is placed in a genus by itself (*Stiltia isabella*). The habits of all are practically identical with those of the common species.

The Coursers, comprising the second subfamily (*Cursoriinæ*), are distinguished

by the absence of the hind toe and a relatively much longer tarsus, while the tail is nearly or quite even, and their food is not taken on the wing. As might be inferred from their common name, they are terrestrial and eminently "running" birds, frequenting mainly the dry, arid, sandy plains and deserts, over which they run with astonishing speed. In the typical Coursers (*Cursorius*) the bill is relatively long and curved, perhaps the best-known species being the Cream-colored Courser (*C. gallicus*) of the deserts of northern Africa, whence it ranges to the Canaries and Cape Verde Islands, and east to Afghanistan and northwest India, and occasionally wanders into continental Europe. In coloration it is rufous-buff above and nearly white below, with the breast tinged with gray and the flanks with blackish, while the wings are blackish, and the tail similar to the back, all the feathers except the middle pair with a subterminal black

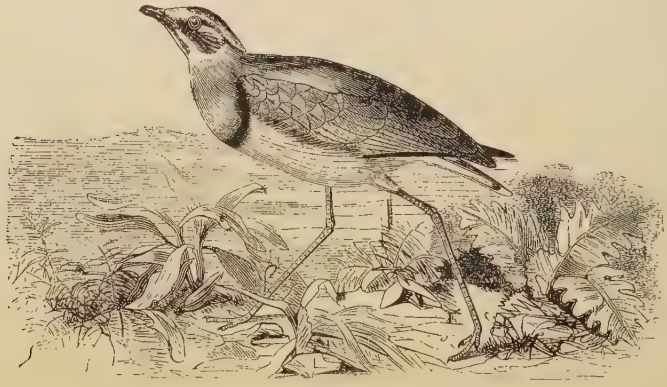


Fig. 129. — Courser, *Rhinoptilus chalcopterus.*

band and white tip, and there is a white band above each eye which meets behind the nape and is bordered below by a black stripe; the length is ten inches. This is usually a shy bird, escaping the intruder by running swiftly away or by squatting prone on the ground with which its colors so harmonize that it becomes exceedingly difficult to detect it. This, and the other species as well, feeds on insects of various kinds and occasionally upon seeds. The two or sometimes three eggs are deposited on the bare sand. Three of the remaining species are confined to Africa, while the fourth, known as the Indian Courser (*C. coromandelicus*), occurs in the Indian peninsula and Ceylon. Passing over the Coursers of the genus *Rhinoptilus* with straight bills, of which there are seven in various parts of Africa and a single exceedingly rare one in India, we come to the so-called Black-backed Courser, or Crocodile Bird (*Pluvianus ægyptius*), which is the sole representative of its genus. It differs from its allies, as already hinted, in having oval instead of slit-like nostrils, while in the interscapular region the plumes are elongated and overhang the lower back. The general color is slaty brown above, the crown, hind neck, and mantle of a greenish

black, the latter bordered with white as is the crown, while the lower parts are white with a broad pectoral band of black. This bird, also known as the Black-headed Plover, inhabits West and Northeast Africa and is especially common on the banks of the Nile, where it may be seen feeding or running rapidly along the sandy bars or flying swiftly over the water, uttering its peculiar chattering note which resembles the words *zic zac*, which is the native name by which it is known. It seems well authenticated that the eggs are buried in the moist sand where they are incubated by the intense heat of the sun. Should the sand over the eggs become dry, the birds have been observed to moisten it by first dipping the breast in the water and applying it to the sand. There are some differences of opinion as to whether this or *Hoplopterus spinosus* is the true Crocodile Bird, but the facts as at present understood seem to favor the latter.

THE SEED-SNIPES

(Family *Thinocoridæ*)

The Seed-Snipes, or Lark-Plovers, of which two genera and some half a dozen species are known, are all peculiar South American birds of decided Quail-like or Partridge-like appearance. They have plump bodies, short legs, long, sharp-pointed wings, and a somewhat fowl-like bill and plumage, on which account they were placed by the earlier writers among the *Gallinæ*, but since their anatomical characteristics were pointed out by Professor Garrod some thirty years ago, it became clear that their affinities, although evidently extending in several directions, are rather with the Plovers. They frequent the bare and desolate districts from Peru and Chile to the southern extremity of the continent, occurring only on the high Andes in the northern portion of their range, but descending to sea-level in Patagonia and the Falkland Islands. Their food consists entirely of seeds, tender buds, and leaves, and their nest is a mere slight depression in the ground lined with a few grass blades. The eggs are pale gray, thickly spotted with two shades of chocolate.

The two genera are very close together, the difference being mainly in the total length of the birds and the shape of the tail, the first (*Attagis*), with three species, being the larger (approximating eleven inches), each having the tail rounded, while in the other (*Thinocorus*) the size is between six and eight and a half inches and the tail more wedge-shaped. In *Attagis gayi* of Chile and Peru the plumage is ashy gray above, blotched and vermiculated with black, and pale cinnamon, marked with narrow wavy lines of blackish below. Similar but much darker is *A. chimborazensis* of the high mountains of Ecuador, while *A. malouinus* of the Straits of Magellan and the Falkland Islands is distinguished by its white breast and abdomen. Comparatively little is known of their habits.

Of the members of the other genus the information is fortunately more extensive, the Common Seed-Snipe (*T. rumicivorus*), which ranges from Pata-

gonia to Bolivia, being especially abundant on the plains of Patagonia and migrating northward to the pampas of Argentina in winter. It is a plump-bodied bird, the smallest of the family, attaining a length of only six inches, the coloration being buffy brown marked and banded with black above and white beneath, with a broad band of black on each side of the throat, which unites and expands into a collar on the fore neck. Mr. Hudson states that the legs and feet are extremely small and feeble, and scarcely able to sustain the weight of the body. "When alighting the Seed-Snipe drops its body directly upon the ground and sits close like a Goatsucker; when rising it rushes suddenly away with the wild, hurried flight and sharp, scraping alarm-cry of a Snipe. . . . They usually go in flocks of about forty or fifty individuals and fly rapidly, keeping very close together. On the ground, however, they are always much scattered, and are so reluctant to rise that they will allow a person to walk or ride through the flock without taking wing, each bird creeping into a little hollow in the surface or behind a tuft of grass to escape observation. During its winter sojourn on the pampas the flock always selects as a feeding ground a patch of whitish argillaceous earth, with a scanty withered vegetation; and here when the birds crouch motionless on the ground, to which their gray plumage so closely assimilates in color, it is most difficult to detect them. If a person stands close to or in the midst of a flock, the birds will presently betray their presence by answering each other with a variety of strange notes, resembling the cooing of Pigeons, loud taps on a hollow ground, and other mysterious sounds, which seem to come from beneath the earth." D'Orbigny's Seed-Snipe (*T. orbignyanus*) is easily distinguished by its larger size; it is found in Peru, where in the Puna region it reaches an elevation of 12,000 to 14,000 feet, in Bolivia, Chile, and western Argentina.

THE THICK-KNEES

(Family *Œdicnemidæ*)

The Thick-knees, Stone Plovers, or Stone Curlews, as they are variously called, form a small but very well marked group, distinguished at once from all the other members of the order by possessing rounded (holorhinal) instead of slit-like nostrils. They have moderately long legs, the tarsus being reticulated all around, and three toes,—the hind one being absent,—which are united at the base by a membrane. The greater or less enlargement of the tarsal joint gives them the name of Thick-knees, while their predilection for stony ground furnishes the basis for their other popular names. They are to a considerable extent nocturnal in their habits and consequently possess rather large, full eyes. The wings are of medium length, while the tail of twelve feathers is more or less graduated. As to location, they prefer in general open, unwooded country, or that but sparsely covered with low scrub, and in habits as well as in structure approach quite closely to the Bustards, with which they are not infrequently

placed, but the points of resemblance to the Plovers and more especially the Oyster-catchers seem greater and of more importance than with the former group. They are relatively rather large birds, none falling below fourteen inches in length, and several exceeding twenty inches, and the plumage is quite uniform, consisting mainly of variously mottled and striped shades of brown or buff. They build no nest, but deposit the two or three gray sparsely spotted or streaked eggs in a slight depression in the ground.

The Thick-knees number about a dozen species, three of which occur in South America and the West Indies, and the remainder in the Old World, the only European species being the Stone Plover (*Œdicnemus œdicnemus*), which ranges over temperate and southern Europe and east to central Asia, being a migrant in the more northern portions of its range, but otherwise is mainly a resident, or spends a portion of the winter in northern Africa or India. This bird is about seventeen inches long, of a mottled pale brown above and white below, streaked with dark brown on the neck and breast; there are two narrow white wing bars and a white stripe beneath the eye. It is a very shy bird, once common in many parts of England, but now rare and apparently approaching extermination there. It prefers stony or sandy soil in flat, open, often desert places, and is more or less crepuscular, feeding well into the night, its food consisting of worms, snails, insects, larvæ, etc. It runs with great swiftness, and when forced to wing flies strongly, but may often attempt to conceal itself by lying prone upon the ground with head pressed closely to the surface, where its mottled colors serve well to render it all but invisible. Its note is a loud, clear *curlew*, uttered mainly at night.

Fig. 130. — Great Stone Plover, *Esacus recurvirostris*.

The other Old World species of this genus, of which there are half a dozen, are all natives of Africa, and the three American forms are also placed here. Their habits are similar to those of the species just described.

Closely related but differing mainly in having a large, massive, compressed bill is the Great Stone Plover or Thick-knee (*Esacus recurvirostris*) of the Indian peninsula and near-by counties, which reaches a length of twenty inches. It is found singly or in pairs, mainly along the sandy or rocky banks of large rivers or along the seacoast, where it feeds on crustaceans, mollusks, etc. Its cry, Mr. Blanford says, is a loud, harsh, croaking note. From Australia to

Borneo the place is occupied by the Australian Stone Plover (*Orthorhamphus magnirostris*), which is the largest member of the family, being twenty-two and a half inches long, and while similar to the last is known by its very differently shaped bill, which is straight and convex. This is more of a coast bird than the others, having a preference for the low, flat shores of the sea, where it feeds on crabs, marine insects, worms, and various kinds of mollusks. According to Gould, it is active at night, giving utterance to a loud scream or cry, resembling the word *wee-lo*, whence the aboriginal name. The two very large eggs are laid on the sand just above the high-water mark.

THE JACANAS

(Family *Jacanidæ*)

Of Brazilian origin the name Jacana[1] has come to be universally applied to a small, well-marked tropical group of marsh-frequenting birds with rather long legs and a general Rail-like appearance, but which are now conceded to be most closely related to the Plovers. The most marked characteristic is the enormously long toes and claws, especially that of the hind toe, which is longer than the toe itself, which enables them to walk with ease over the water lilies and other aquatic plants growing in ponds and marshes. They are small birds, the largest not much exceeding a foot in length when in the non-breeding plumage, and the smallest but half this, and they have a rather short neck, small head, and a moderately long bill which may or may not be provided with a frontal shield or lappet, while the wrist joint is armed with a usually strong spur. The plumage is rather handsomely colored, showing much of black, brown, golden, and white, the first often glossed with purplish or greenish, and relieved by dashes of greenish yellow; in some there is a marked difference between the breeding plumage and that worn at other seasons. The Jacanas are very widely distributed, ranging through middle America and northern South America, reappearing in Africa south of the Tropic of Cancer, and thence spreading through the Indian and Malay peninsulas to Australia, Borneo, and the Philippines. Their habits are everywhere very similar, as they frequent slow-flowing streams, ponds, and marshes, running with ease over the lily pads and feeding on seeds and tender bits of vegetation, as well as insects and crustaceans. Some of them seem to take pleasure in dis-

Fig. 131. — Mexican Jacana, *Jacana spinosa*.

[1] Pronounced Hasana.

playing the wings, which they do by raising them over their heads, and Hudson states of the Common Jacana of the Plata district (*Jacana jacana*), that "when several of these birds live in company, occasionally they all in a moment leave their feeding, and with quick, excited notes, and clustering together in a close group, go through a singular and very pretty performance, all together holding their wings outstretched and agitated, some with a rapid fluttering, others with a slow-moving, leisurely motion like that of a butterfly sunning itself. The performance over, the birds peaceably scatter again." The nests of the Jacanas are very simple structures, placed usually on masses of floating weeds amongst reeds or sometimes on the ground near the water. They lay very glossy eggs, usually four in number, of a buff, yellowish brown, or olive ground-color and more or less thickly spotted with brown, though in some cases the spots are absent.

The Jacanas number about a dozen species disposed among some five or more genera, of which the typical one — *Jacana* — is confined to the New World and is distinguished by the presence of an upright, leaf like, fleshy wattle on the forehead. Of these the Mexican Jacana (*J. spinosa*) is found from the lower Rio Grande valley in Texas throughout the whole of middle America and the Greater Antilles. It attains a length of about nine inches and has the upper parts, including the neck and chest, of a greenish or purplish black, the lower parts of a rich purplish chestnut, and the flight feathers of the wings a clear greenish yellow or apple-green color. The bill is bright yellow and the wattle in life is said to be red or orange.

The largest and handsomest member of the group is the Pheasant-tailed Jacana (*Hydrophasis chirurgus*) of the Indian peninsula and the Indo-Chinese countries, and is the only representative of its genus. In the winter plumage the upper parts are mainly brown, slightly mixed with white, and the lower parts white, as are the wing-coverts and outer tail-feathers, while there is a line of pale brownish yellow running down each side of the neck, this bordered with black, which expands into a broad collar of black on the breast. In the breeding plumage the head, throat, and fore neck are white, the crown black, the hind neck golden yellow, bordered by a black line, while the remainder of the upper and lower parts are mainly chocolate-brown or blackish; the tail, then very greatly lengthened, is black. The sexes are alike at all times, the female exceeding the male in size. In winter plumage the male is only about twelve inches long and in breeding plumage about eighteen inches, while the female attains a length of fourteen and some twenty-one inches at these respective seasons. Another feature of interest is the modification of the tips of the first and fourth primaries. This species frequents rather open pieces of water and is not especially careful in concealing itself; its cry is said to resemble the mewing of a kitten. The nest is the usual floating structure, and the four exceedingly glossy eggs are brown or greenish bronze and unspotted.

The other Indian and Oriental species is the Bronze-winged Jacana (*Metopidius indicus*), also the sole member of its genus. It is smaller than the other, has no distinct breeding plumage, and lacks also the lappet and modified tips

to the secondaries. Its habits are similar to those of its handsomer relative, but the glossy eggs, usually four in number, are buff or olive, marked with a network

Fig. 132. — White-necked Jacana, *Phyllopezus albinucha*.

of black or brown lines. The little African Jacana (*Microparra capensis*), the smallest of the family, is a shy bird of the marshes and pools of South and East Africa, with the plumage a mixture of reddish orange, greenish yellow, black, and white.

Another African species is the White-necked Jacana (*Phyllopezus albinucha*),

so called from the fact that the nape, sides of the neck, and hind neck are pure white, while the general color above, including the wings, is cinnamon-rufous, the rump white, the primaries black, and the sides of the face, throat, and fore neck black, with the under parts deep chestnut. Its habits are those of its kind.

THE GULLS AND THEIR ALLIES

(Suborder *Lari*)

Without going extensively into the historical side of the question, beyond the statement that the Gulls and their immediate relatives were formerly — and by some the Auks are still — placed in the same group with the Petrels, it seems now generally acknowledged that they are most closely related to the shore-birds (*Limicolæ*), with which they essentially agree in the arrangement of the feather pattern, as was long ago pointed out by Nitzsch, as well as in nearly every essential detail of their anatomy. They are for the most part large or medium-sized birds of aquatic habits, with long, usually pointed wings in which there are eleven primaries, the terminal one being very short and inconspicuous, while the three front toes are webbed and the hind toe (sometimes absent) is small, raised above the level of the others and not united with them. As regards the details of the skeleton it may be mentioned that the nostrils are slit like (schizorhinal), the palate split (schizognathous), and the basipterygoid processes absent, in which feature they differ from the typical *Limicolæ*, while they agree in having fifteen cervical vertebræ and a U-shaped furcula. In another suggestive manner the resemblance between the Plovers and the members of the present group is shown in the nidification, as they generally make no nest or only a slight one of grass, and the one to four eggs are double-spotted, resembling the eggs of Plovers so closely that a considerable percentage of the eggs sold in Europe as "Plover's eggs," it is said, are laid by Terns. The young when hatched are covered with down, which, however, is of a more complex nature than that clothing the young Plovers, and, although they seem able to run about, they are fed by the parents in or near the nest for some time.

The present suborder as here accepted embraces two families, or as they might perhaps better be called, superfamilies,— the *Laridæ*, or Gulls, Terns, Skimmers, and Skuas, in which the sternum is provided with four notches, and the *Alcidæ*, or the Auks and their kin, which have a two-notched sternum. Following Mr. Blanford, the *Laridæ* are considered to include four families or subfamilies,— the *Larinæ*, or Gulls, the *Sterninæ*, or Terns, the *Rhynchopinæ*, or Skimmers, and the *Stercorariinæ*, or Skuas and Jaegers. The first three are distinguished by the fact that the bill is without a cere and the claws but moderately curved, not being shaped or fitted especially for grasping, while the cæca or blind intestines are rudimentary. In the Skuas and Jaegers, however, the bill is provided with a cere for nearly half its length, and the feet are armed with strong, much-curved, and very sharp claws, which, as will be shown later, fit them for a rapacious existence; their cæca are long and well developed.

THE GULL TRIBE

(Family *Laridæ*)

The birds here included, although differing somewhat among themselves, constitute a compact and well-marked group, sometimes called the Long-winged Swimmers. They are mostly gregarious and noisy birds, of large or medium size, with long, slender wings, all of them, especially the Terns, enjoying strong and sustained powers of flight. They have the legs placed nearer the middle of the body than do the Auks, thus standing horizontally rather than erect, while the toes are usually four in number, the three front ones being webbed for swimming. They are mainly birds of the ocean, although occasionally found about fresh-water lakes and large ponds, and exceptionally they may take up their permanent abode far inland, as Mr. Hudson relates of the Spot-winged Gull of Argentina. While all are good swimmers the Gulls are particularly so, spending much time on the water; but their flight is more labored and less graceful than that of the Terns. The food consists of fish and other aquatic life, and also very largely of refuse of all sorts, which accumulates on the surface, especially in harbors and bays, and in the removal of which they perform an important function in the general economy of nature. Inland they also feed on insects, grasshoppers, grubs, etc., some Gulls regularly following the plow to feed upon such as may be in the freshly upturned soil, while many are fond of the eggs of other birds, and still others kill and devour their feathered kin. In distribution they are mainly cosmopolitan, ranging in suitable locations throughout the globe, although curiously enough no Gulls are found in the vast ocean area between South America and the island-continents of Australia and New Zealand. They nest mainly in colonies, usually on the ground, though sometimes on rocky ledges, while a few, such as the White Tern (*Gygis alba kittlitzi*) of the Pacific islands, frequent forests and deposit their single egg on the bare limb of a tree or in bulky nests built in trees.

The Gulls (Subfamily *Larinæ*), of which there are some fifty species, are found almost all over the world, being especially abundant along oceanic shores, but also occurring, where conditions are favorable, about various inland bodies of water. In popular parlance they are distinguished from their near relatives the Terns by their usually larger size and nearly square tails, but in fact this distinction more or less fails, for there are several Gulls with forked or graduated tails and some Terns with almost square tails. They may always be distinguished, however, by the culmen or ridge along the upper mandible, the terminal portion being decidedly curved in the Gulls and nearly straight in the Terns. In feeding the Gulls as a rule rest on the water, while the Terns hover over or plunge into the water after their food, giving rise to the local name of "Strikers"; some Gulls, as the Laughing Gull, occasionally fly over the land hawking for grasshoppers and other insects. "The predominating color of the adult birds," says Stejneger, "is white with a gray mantle, varying in shade from the most delicate pearl-gray to dark blackish

slate, or nearly black, and the head is often more or less marked with black in summer. The seasonal change is not great, and affects chiefly the color of the head, which, in species with black heads, turns white in winter, while the White-headed Gulls usually get that par streaked with dark during the same season."

The range in size among the Gulls is considerable, the smallest being the Little Gull (*Larus minutus*) of sub-Arctic and temperate Europe and Asia, which is only eleven inches in length, and the largest is the Great Black backed Gull (*L. marinus*) of the North Atlantic, which is from twenty-nine to fully thirty-two inches long. In habits the Gulls are all very similar, feeding largely on fish and such scraps and refuse as finds its way into bays and harbors. Off every seaport town may be found at all times a noisy, quarrelsome horde of various Gulls. They are gregarious at all seasons, but especially so during the nesting period, when they congregate to the number of hundreds, thousands, and in some cases almost millions, where their screaming "overnoises the thunder of the surf." The nests are placed on the ground, on bare ledges of rock, or in some species among the rank grasses on islands and shores, and the eggs number from two to four, with a pale brownish, light bluish, or buffy ground color, irregularly spotted or blotched with brown and lavender.

The Gulls are divided into seven or eight genera, the typical and largest being *Larus*, with forty-five species or forms. About thirty species of Gulls are found either regularly or occasionally in North America, and about a dozen in Great Britain. Among them all it will be possible to mention only a few of the more conspicuous or interesting.

Ivory Gull. — On the basis of the tarsus being roughened or serrated behind, the beautiful Ivory Gull (*Pagophila eburnea*) is placed in a genus by itself. It is of medium size, the length being from fifteen to nineteen inches, with the plumage pure white throughout, although the young are sparingly spotted with black, while the bill is greenish yellow and the feet jet-black. This species is circumpolar in distribution, breeding mainly in Spitzbergen and coming south in winter along the coasts of northern Europe and as far as Newfoundland and New Brunswick on the American side.

The **Kittiwakes** (*Rissa*), of which there are three forms, are separated mainly on the ground of the hind toe being rudimentary or entirely absent. With the exception of a bluish gray mantle the plumage is also pure white, the legs and feet in the Common Kittiwake (*R. tridactyla*) of the North Atlantic, and its subspecies, the Pacific Kittiwake (*R. t. pollicaris*) of the North Pacific, being black or dusky and bright red in the Red-legged Kittiwake (*R. brevirostris*) of the coasts and islands in Bering Sea. In writing of the birds of the Pribilof Islands, Mr. Palmer says the last is the "most beautiful species on the islands. Always graceful, whether on the cliffs or flying, its beautiful form and delicate snow-white plumage, with its vermilion feet, adds much to the avifaunal wonders of these islands." It breeds abundantly on the Pribilofs, placing the nest, which Mr. Elliott says is quite substantially made of dry grass and moss cemented with mud, on the most inaccessible shelves and points of rock, where it can seldom

be reached unless a person is lowered down to it by means of a rope passed over the cliff. The eggs are two, rarely three, in number.

Typical Gulls. — In the typical Gulls (*Larus*) the hind toe is perfectly developed though small, and the tail is even, but in "size, color, and all other characters they are extremely variable," especially when in immature plumage, it being in fact almost impossible to separate the young by obvious distinctive characters. Of the forty-five forms, over twenty occur regularly or accidentally in North America, the entire number falling into two groups, in the first of which the head of the adult is white in summer, while in the second the head is mainly black at this season. Without attempting to enumerate all, as examples of the white-headed group mention may be made of the large Glaucous Gull (*L. glaucus*) of the Arctic seas and the coasts of the North Atlantic, which reaches a length of twenty-six to thirty-two inches, its place in Bering Sea and adjacent waters being taken by the Point Barrow Gull (*L. barrovianus*), which is from twenty-five to twenty-eight inches long. Hardly to be distinguished from the last two in plumage, but smaller and with a comparatively longer wing is the Iceland Gull (*L. leucopterus*) of the North Atlantic, and with the same character of plumage, but with the primaries white at the tips and with gray subterminal spaces, are two North Pacific species, Kumlien's Gull (*L. kumlieni*) and Nelson's Gull (*L. nelsoni*), which differ mainly in the length of the wing and bill. Mention must be made of the Herring Gulls, the typical form of which (*L. argentatus*) occurs in northern Europe and in eastern North America, and may be known by its yellow bill, flesh-colored legs and feet, and black outer primaries. It is one of the most abundant species along the English coasts throughout the year, where it follows shoals of herrings or feeds upon garbage and marine animals as well as carrion. It nests in a variety of places, such as flat islands and precipitous rocky shores, making usually a bulky nest of seaweeds and other plants, and lined with dry grass. On the American coasts it is the commonest and most abundant Gull in winter in the Eastern and Southern States, where it frequents the rivers and harbors to feed, unmindful of the presence of man, upon the scraps and garbage so abundantly floating there. It breeds from Maine northward, Mr. Kennicott having found its nests in great numbers on an island in the Great Slave Lake, where they were placed on the ground, usually under bushes and quite carefully constructed of sticks, leaves, and feathers. On the islands in the Bay of Fundy, Dr. Brewer found the Herring Gulls nesting on the ground, and also on high inaccessible cliffs as well as in very tall spruce trees, the latter habit acquired, it was told him, after repeated depredations by man. With the plumage much as in the Herring Gull, but distinguished by its smaller size and a black band near the tip of the bill, is the Ring-billed Gull (*L. delawarensis*), which inhabits the whole of North America, but is more abundant in the interior, nesting from Newfoundland and Minnesota northward.

Coming now to those species in which the head is uniform black or dusky in summer and the breeding plumage more or less rose-tinted, mention must first be made of the Black-headed or Laughing Gull (*L. atricilla*) of the Atlantic coast of the United States in summer and south as far as the lower Amazon in

winter. Between fifteen and seventeen inches in length, it has the head sooty slate-color, the mantle slaty gray, and the remainder of the plumage pure white, except that the five outer primaries are entirely black. The name of Laughing Gull is derived from its peculiar note, which is said to resemble "in the most striking manner a loud burst of derisive laughter, and its cries of deep distress strongly resemble shouts of laughter, and seem expressive of sentiments quite unlike what they are intended to convey." It is found nesting from Texas and Florida to Maine, building a compact nest of seaweeds and grasses on the ground in marshes. In the interior of North America occurs the allied but smaller Franklin's Rosy Gull (*L. franklinii*) and the Bonaparte's Gull (*L. philadelphia*), which ranges throughout the whole of North America, but breeds only or mainly far northward. The Little Gull (*L. minutus*), of which mention has already been made as being the smallest species, also falls within the group of black-headed forms. In summer the head is deep black and the mantle pearl-gray, while in winter the head is white. One of the most abundant and familiar species about the English coasts is the Lesser Black backed Gull (*L. fuscus*), known by the black or slate-gray mantle and otherwise white plumage, which in point of abundance is nearly or quite equaled by the Black-headed Gull (*L. ridibundus*), which is distinguished by its much smaller size, blackish head, neck, and mantle, and red instead of yellow bill.

Rosy Gull. — As the sole representative of its genus, the beautiful Ross's Rosy Gull, or Wedge-tailed Gull (*Rhodostethia rosea*), is distinguished from the typical Gulls by its graduated tail and relatively shorter culmen. This handsome bird has the mantle uniform pearl-gray with the remainder of the plumage white, usually tinged with delicate, peach-blossom pink, while in summer the middle of the neck is encircled by a narrow black collar which entirely disappears in winter. It requires several years, it is said, for the birds to reach the full plumage. Their home is in the high north, and even in winter they come south only to the northern border of Alaska, Kamchatka, and Bering Sea. Their nesting places were unknown until 1905, when Mr. S. A. Buturlin found them breeding in the Kolyma Delta, in northeastern Siberia. They nest on bogs or grassy places in small colonies of from two or three to ten or fifteen pairs, constructing a shallowly cup-shaped nest of grasses and laying two or three handsome eggs of a rich olive-green, spotted with chocolate-brown.

Swallow-tailed Gulls. — The last members of the subfamily to be noticed are the Swallow-tailed or Forked-tailed Gulls, the two species of which are known at once by their deeply forked tails, in which feature they approach the Terns. The smaller, known as Sabine's Gull (*Xema sabinii*), is only thirteen or fourteen inches long, and has the head and neck uniform lead-colored, the mantle bluish gray, while the remainder of the plumage with the exception of a black collar is pure white. It is a native of Arctic America and eastern Siberia, coming south in winter to Peru and the Great Lakes in the interior of North America. It breeds on the tundras of Siberia, on islands in the Arctic Ocean, and at various points in Alaska, making a grass-lined nest in depressions in the moss.

The Swallow-tailed Gull (*Creagrus furcatus*), sometimes placed in the last-

mentioned genus, though really very distinct, is very much larger, reaching a maximum length of twenty-three inches. It is found on the Pacific coast of South America and in the Galapagos Islands, where it was observed breeding abundantly on a small islet lying near the island of Wenman by Messrs. Snodgrass and Heller, who state that it deposits its single egg only on the bare rock of the cliffs, without constructing a nest of any sort. It is, they say, an extremely noisy species, its notes being varied from shrill, elongated cries to harsh guttural sounds, uttered while on the rocks as well as when on the wing.

Fig. 133. — Fork-tailed Gull, *Xema sabinii*.

The Terns (Subfamily *Sterninæ*). — The Sea Swallows, as the Terns are often called, number between fifty and sixty species, distributed among nearly a dozen genera, the largest (*Sterna*) embracing the typical Terns with over thirty species. The characters separating them from the Gulls have already been given, and like the Gulls they are widely distributed throughout the world, being abundant along oceanic shores, as also about many inland lakes, ponds, and rivers. They are in general smaller and slimmer than the Gulls, the extremes of length being six and twenty-two inches, with an average length of between twelve and eighteen inches. The coloration of the plumage is also quite like that of their relatives, which they likewise resemble in feeding habits except that they plunge more into the water for their usually living prey. The animated scene presented by a flock of Terns is an interesting spectacle, as "dozens dart down at once, cleaving the water like darts, and, rising again into the air, shake the salt spray from their feathers by a single energetic movement, and make ready for a fresh plunge." On the wing the Terns are strong, rapid, and graceful, but, as Hudson says, the flight is "unlike that of any other bird, whether of the sea or land; it is more airy, and suited to the pale, slender, aërial figure; buoyant and slightly wavering, it reminds one a little of the high, apparently uncertain flight of some large-winged butterflies; and it is in perfect harmony, not only with the slimmer form, but with the idea of a being whose life is spent amid wind and mist and fluctuating wave."

The Terns, with the exception of the somewhat anomalous Noddies, nest often in vast colonies on the ground or on rocky ledges, occasionally, as already mentioned, on the limbs of large forest trees. The eggs, one to four in number, are placed in a slight depression, and sometimes the nests, if they may be so

FIG. 134.—Terns and Skimmers nesting on Cobb Island, Virginia. (Courtesy of the American Museum of Natural History.)

dignified, are so close together that it is difficult to walk among them without stepping on eggs or young birds. In speaking of the nesting communities of the Sooty Tern (*S. fuliginosa*) on the Fanning Islands, Dr. Streets says that the birds "formed a cloud when they arose from the ground, and their clamor deadened the roar of the surf. They make no attempt at building a nest, but deposit their one egg anywhere on the bare ground. The eggs were almost as numerous as the clinkers on the coral beach." The Noddies above mentioned usually nest on mangrove trees or such bushes and trees as usually grow around the borders of oceanic islands, but sometimes they nest on rocky ledges and rarely on the ground. When in trees or bushes the nests are usually bulky structures made of sticks and lined with grasses, etc.; they lay but a single egg.

Among the sixteen or eighteen species of Terns found regularly or occasionally in North America, mention may first be made of the Gull-billed Tern (*Gelochelidon nilotica*), which is nearly cosmopolitan, reaching the Atlantic coast as far north as Long Island and Massachusetts, and is fairly common on the coasts of the Southern States. It is easily distinguished from the other Terns by its especially harsh voice and heavy black bill. Of the typical Terns (*Sterna*) perhaps the commonest along the Atlantic coasts of North America is the Wilson's or Common Tern (*S. hirundo*), which formerly nested in great colonies at many points; but owing to the destruction by plume and egg hunters the numbers were sadly depleted and they seemed almost on the point of extermination, until wardens were secured on several breeding grounds, such as Gull Island, Long Island, and Muskeget off the Massachusetts coast, and by protection for a few years the colonies have been in a measure restored. This species also nests to some extent in the interior from the Gulf States to the Barren Grounds, and beyond our shores is found throughout the greater part of the Northern Hemisphere. An allied species ranging generally over North America is Forster's Tern (*S. forsteri*), which is distinguished by having the inner web of the outer tail-feathers darker than the outer web, an orange-colored instead of red bill, and other characters, while even more closely related is the Arctic Tern (*S. paradisæa*), which may be known generally by the absence of the black tip to the otherwise red bill and grayer under parts. It is found in summer throughout the Northern Hemisphere, breeding in America from Massachusetts to the Arctic regions, and strangely enough a recent Antarctic expedition has found it abundant during the northern winter (Antarctic summer) in the Weddell Sea and even south of the Antarctic Circle, thus showing a range from 82° N. to 74° S. Often associated with the Common Terns but less approachable and tame is the Roseate Tern (*S. dougalli*), known in summer by its pure white tail and white, delicately pinkish lower parts; it is widely spread along both coasts of the Atlantic, being one of the abundant species about the British Islands. One of the smallest species is the Least Tern (*S. antillarum*), which is but nine inches long, while but slightly larger is the Little Tern (*S. minuta*) of the Old World.

The **Noddies** (*Anous*), so called, originally by sailors, on account of their stupidity in permitting a near approach of man, form an interesting group of some half dozen species of tropical oceanic birds obviously related to the Terns,

but differing in their heavier, more labored flight, as well as in their habits, as most of their life is spent on the surface of the open ocean, often at great distances from the land, where they secure their food of crustaceans, floating animals, and offal. They are, for the group, birds of medium size, with the bill longer than the head and strong, the upper mandible curved gradually to the rather acute tip, very long, pointed wings, and a graduated instead of forked tail, while the tarsi are rather short and slender, and the toes long and united by a full web. The plumage is mainly dusky throughout, becoming grayish white on the forehead, and on the basis of a slenderer bill and the greater length of the third pair of tail feathers, counting from the outside, several of the forms are sometimes separated under the generic name of *Micranous*, but the difference seems hardly worthy of generic rank.

The best-known species is the Common Noddy (*A. stolidus*), which is found practically throughout the world in suitable intertropical or subtropical situations, often breeding in colonies of vast size, and in some cases, as on the Tortugas, building regular nests on low trees, while in other localities they are placed on rocky cliffs. The Pacific Noddy (*A. s. ridgwayi*) differs in being darker and much less brown than the last. It is found mainly about Cocos and Socorro Islands, where Mr. Anthony found them nesting in abundance on a small rock, placing the single egg on the bare rock without any attempt at nest building. About the Galapagos Islands another still darker form occurs (*A. s. galapagoensis*), which Snodgross and Heller tell us nests in holes in the face of the cliffs, making a scant nest of a few twigs laid on the bottom of the cavity. With habits similar to those of the common Noddy, but smaller in size and with the white of the crown abruptly defined against the sooty brown of the neck and upper plumage, is the White-headed Noddy (*A. leucocapillus*) of the southwestern Pacific, ranging occasionally as far as the Bay of Bengal.

The White Noddy (*Gygis alba*), which ranges from the South Atlantic and Indian oceans to Australia and the Pacific islands, is easily distinguished by its snow-white plumage, black bill, and blue irides.

The Skimmers (Subfamily *Rhynchopinæ*). — The Skimmers, known also as Scissors-bills, Razor-bills, or Shearwaters (not the true Shearwaters, however), while quite Tern-like in many respects, differ from them, as indeed they do from all other birds, by the peculiar modification of the bill, this being long, laterally much compressed, and with the lower mandible no thicker than a knife-blade. The lower mandible is also much longer than the upper one, which is itself freely movable, the bill throughout being an obvious adaptation for securing their food, which consists of small fish, shrimps, etc. They do not dive for their food as do the Terns, nor do they pick it up while swimming, for they rarely sit upon the water; but they obtain it by skimming rapidly over the surface with the lower mandible dipped into and cleaving the surface, thus scooping it up much after the manner of whales. The thinning of the lower mandible is clearly for the purpose of reducing the friction in passing through the water, while the upper one is shortened and has become movable to keep it out of the way. As regards their other characters, the Skimmers are birds of

medium size, exhibiting a length of between sixteen and twenty inches, with very long, slender wings, a short and slightly forked tail, and very small feet in which the webs are deeply indented between the middle and inner toes. The plumage is pure white below and black with more or less white-tipping to certain of the feathers above. In flying, the body is carried at an angle instead of horizontally, as in most birds, in order that the wings may clear the water as they skim over its surface. Most of the feeding is done in the morning and at dusk, or possibly in the night, the birds mainly resting during the middle of the day. Darwin observed the Black Skimmers in South America busily engaged in feeding in a shallow lake which was teeming with small fish. He states that "they kept their bills wide open, with the lower mandible half buried in the water. Thus skimming the surface, they plowed it in their course; the water was quite smooth, and it formed a most curious spectacle to behold a flock, each bird leaving its narrow wake in the mirror-like surface. In their flight, they frequently twist about with extreme rapidity, and so dexterously manage, that with their projecting lower mandible they plow up small fish, which are secured by the upper half of their scissor-like bill."

The Skimmers are clearly of ancient origin, as two fairly well marked species have been found in the middle Tertiary of Patagonia. The living species, five in number, are placed in a single genus (*Rynchops*) and are quite widely dispersed in the temperate and tropical portions of North and South America, Africa, and the Indian peninsula. But one of these, the common Black Skimmer (*R. nigra*), reaches our Atlantic coasts, where it nests in greater or less abundance from Florida to southern New Jersey, and later in the season often wanders considerably to the northward. It makes no nest, but lays the three to five handsome eggs in a slight depression in the bare sand. The Indian Skimmer (*R. albicollis*), according to Mr. Blanford, "is usually seen on broad and smooth rivers down to the tideway, not in torrents nor, so far as is known, on the sea. They are usually found in the morning and evening flying, often in scattered flocks, rather slowly close to the water, now and then dipping their bills in the stream." They occasionally catch fish, but he doubts if it is their general custom, and asserts that the use of the bill is still unknown, a statement in direct conflict with that of his distinguished countryman.

Skuas and Jaegers (Subfamily *Stercorariinæ*). — The Skuas[1] and Jaegers are often called the Hawks and Vultures of the sea, for there they exercise the same domination over their feathered companions and altogether play much the same rôle as do the birds of prey on the land. They are large, strong, swift-flying, Gull-like birds, distinguished at once by the beak, this being straight for two thirds of its length and for the remainder curved into a strong hook much as in the Hawks, and in further imitation of them the bill is provided with a cere the lower edge of which overhangs the nostrils. "Their predatory habits, extreme violence in attack, and readiness to take and destroy their feathered fellow-creatures and toilers of the deep when occasion offers

[1] The word *Skua* is said to be a corruption of *Skooi*, the Shetland Island name by which these birds are known.

have won them a reputation among birds similar to that of a pirate among men — the lawless rover of the sea who is without compunction and whose hand is against every man."

By some systematists both Skuas and Jaegers are combined in a single genus under the appellation of Skuas, but they are readily distinguished, the latter being large birds the size of the largest Gulls, while the Jaegers are only equal in dimensions to the smallest Gulls. A further mark of distinction is afforded by the two central feathers of the tail, these in the Skuas being only about half an inch longer than the others, whereas in the Jaegers they project from three to nine inches beyond their fellows.

The Skuas (*Megalestris*) feed principally upon fish, but they devour other birds, especially the young or such as are sickly or weak, and are also very fond of eggs, and on occasion will eat carrion of various kinds. In feeding, however, they rarely take the trouble to fish for themselves, but, following in the wake of more industrious Terns and smaller Gulls, they keep a watchful eye on them, and no sooner is one observed to have been successful than they at once give chase, and, no matter how fast the frightened bird may fly, the grim pursuer is always there, and at last in sheer despair it disgorges the recently swallowed fish, which the Skua swoops to catch often before it reaches the water. Dr. Kidder, who studied the habits of the Southern Skua (*M. antarctica*) on Kerguelen Island, was at first deceived by its Hawk-like appearance, "its manner of flight, watchfulness of the ground over which it flew, and habit of perching in spots commanding a wide view, all suggesting this impression." In order to ascertain if they would actually kill their own game, he threw toward a pair of them a half-fledged young Petrel as large as an ordinary domestic fowl. It was immediately pounced upon, killed, and partially devoured.

The nest consists usually of a slight hollow scratched in the ground and rudely lined with a few sticks or bits of grass, or occasionally it is placed on a bare rock. The eggs, two in number, are of an olive-color with numerous spots of brown or chocolate, especially at the larger end. The birds are very artful in concealing the location of the nest or in leading the intruder away from it, but when it is once disclosed, they defend it with a fierceness hardly equaled by any other birds, — ravens, eagles, dogs, foxes, and even man being violently assailed, and not rarely put to rout. Dr. Kidder speaks of discovering a nest containing two eggs and was attacked at once by both birds, but after killing the male by a fortunate shot from a revolver and emptying the other chambers uneffectively at the female, "was kept standing nearly twenty minutes, pelting the enraged bird as she swooped down at my head, with the two eggs in plain sight but not daring to pick them up. A lucky throw finally disabled her, and I secured the eggs."

Four species of *Megalestris* are known, the Common or Great Skua (*M. skua*) of the North Atlantic, the Chilean Skua (*M. chilensis*) of southern South America, the Southern Skua (*M. antarctica*) of the islands of the Southern Ocean, and Maccormick's Skua (*M. maccormicki*) of the Antarctic continent. They are all largely solitary in their habits, each following a flock of Gulls or Terns.

The Jaegers (*Stercorarius*), of which three species are known, have practically the same habits as their larger relatives, obtaining their main subsistence by compelling the Terns and smaller Gulls to disgorge their recently captured fish, although they are not averse to carrion, and will even feed on berries such as those of the crow-berry (*Empetrum*). They nest in colonies and lay two, three, or rarely four, olive or brownish, deeply spotted eggs. Often the nesting sites are in the vicinity of fresh water, as one species, the Pomarine Jaeger (*S. pomarinus*), is more of an inland bird, feeding largely upon field mice and lemmings. The Jaegers are all found in the northern portions of the Northern Hemisphere, breeding mainly within the Arctic Circle, but during the remainder of the year they are widely scattered over the globe.

THE AUKS, PUFFINS, AND MURRES

(Family *Alcidæ*)

As already pointed out, the members of the present group agree in all essential anatomical characters with the *Laridæ*, but are distinguished at once by the complete absence of the hind toe, and a two-notched instead of a four-notched sternum. They are for the most part medium-sized or small birds with a stocky, somewhat compressed body and large head, mostly rather short but pointed wings (the Great Auk is a notable exception), so that when on land their attitude is more nearly erect than is that of Gulls and Terns. The anterior toes are fully webbed and armed with sharp, claw-like nails, for these birds are expert swimmers and divers, while the tail is always short though of normal composition, and the bill extremely variable, as will be shown later. The sexes are alike in coloration and the young are little different, but there is often considerable difference between the summer and winter plumage. The members of this family are without exception maritime, the major portion of their lives being spent on the open ocean, often at a great distance from shore, the land being visited only during the short nesting season. They are confined exclusively to the northern parts of the Northern Hemisphere, where they fill in a measure the place occupied by the Penguins in the opposite hemisphere, but not a single species reaches into or beyond the tropics. The habits of the group are remarkably similar, as they secure their food of fish, crustaceans, and other aquatic life in the open sea, and nest, often in communities of vast size, on the rocky shores and precipitous cliffs of the Arctic islands and coasts. The egg is usually single, though in the Guillemots there may be as many as three, and both birds and eggs are of supreme importance to the natives of the far North, supplying both food and clothing.

The present family numbers about a dozen genera and some thirty species, and is evidently of considerable antiquity, as several fossil forms have been found in the middle and later Tertiary. It is capable of division into two not very sharply defined subfamilies, — the *Fraterculinæ*, which embraces the Puffins and Auklets, and the *Alcinæ*, or typical Auks, Murres, and Guillemots.

Puffins. — We may first consider the Puffins, or Sea Parrots, which are certainly the most grotesque and in many respects the most interesting in the entire group. They are chiefly remarkable for the high, extremely compressed, grooved, and brilliantly colored bill, which seems altogether too large for the size of the body, as may be seen from the accompanying figures, and, moreover, it was discovered a few years ago that portions of the bill are regularly shed at the close of the nesting season, so that in winter the bill is quite different from its summer appearance. "By examining the bill of nesting birds," says Dr. Stejneger, "we find that it consists of two quite differently colored parts,—a terminal one, with several transverse grooves, and a basal, purplish, yellow, or green part separated from the former by a furrow, and again subdivided by other furrows into several distinct pieces. Toward the end of the nesting season the furrows between the plates become deeper, until finally they are entirely detached, when they fall off, giving place to a brownish soft membrane." In the Tufted

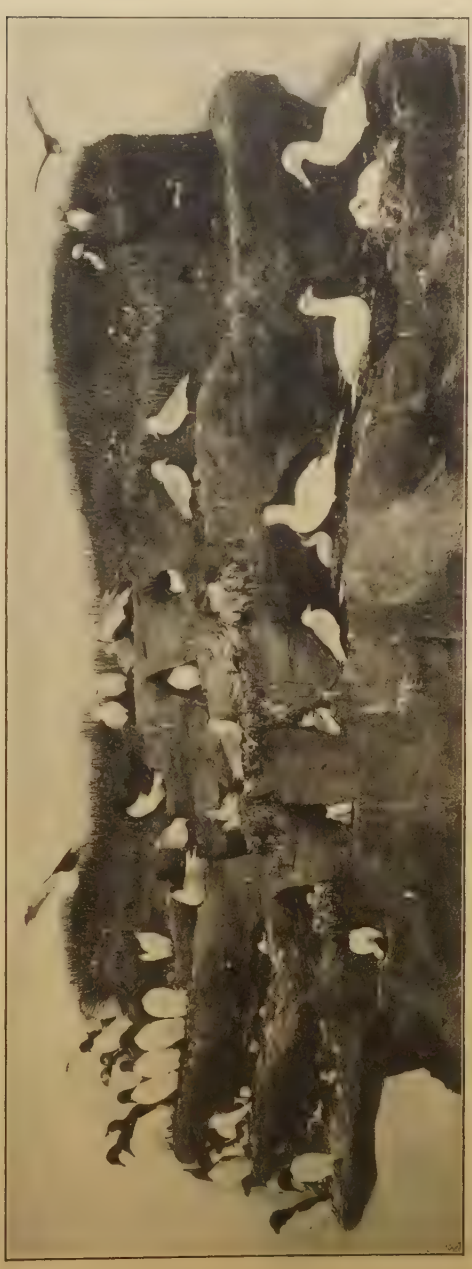


Fig. 135. — Murres, Puffins, Kittiwake Gulls, and Gannets nesting on Bird Rock, Gulf of St. Lawrence. (Courtesy of the American Museum of Natural History.)

Puffin (*Lunda cirrhata*) there are even processes around the eyes which are deciduous like the portions of the bill.

Of the four species of Puffin known in this country, three are found in the North Pacific and one in the North Atlantic. They are rather small birds from eleven to fifteen inches long, and quite uniform black or sooty black above and white or sooty grayish beneath. They are gregarious at all seasons of the year, but especially so during the nesting time, which is mainly June and July. The single white, sometimes faintly brownish spotted egg is deposited either in a burrow excavated by the birds themselves, or in deep crevices among the rocks. Their food consists largely of fish-eggs, crustaceans, etc.

The Tufted Puffin (*Lunda cirrhata*), the only member of its genus, inhabits the North Pacific, being especially abundant in the Bering Sea, and coming south in winter as far as Lower California. It may be known from the others by the presence of thick pendent tufts of long, silky, straw-colored feathers, which spring from the sides of the head behind the eyes, and dark-colored, instead of white, under parts. In summer the terminal half of the bill is bright red and the basal portion yellowish olive, while in winter the basal portions are covered with soft dusky brown skin. This species is extremely abundant on the Commander Islands and Kamchatka, where it forms quite an important article of food for the natives, who also employ the skins in making articles of clothing. The return of the birds in spring is looked forward to with great anticipation by the natives, who capture them in large numbers and in a very simple manner. The following account is from Dr. Stejneger, who spent several years in studying the birds of the far North: "Hundreds and thousands crossed and recrossed the island, coming from all directions, and disappearing on the opposite side, in order to return again and again. A wonderful sight! The black birds with their conspicuous white face-mark, their long and floating ear-tufts bent like the horns of a ram, and the large green-and-red colored beaks and red legs, looked more like fantastic creatures of the tropics than inhabitants of the less extravagant North. Their flight seemed to have no particular aim except to view and review the spot where they were going to take up their summer abode. Like black specks they rose from the horizon, heading for the island; the nearer they came the bigger they grew, until they passed over us, disappearing as specks again on the other side, and when first started nothing seemed to be able to bring them out of their straight course. These clumsy-looking, puffy birds possess, nevertheless, a very rapid flight. The natives take advantage of these peculiarities," stationing themselves on the higher portions of the island with a large net some four feet in diameter, fixed to a light pole ten or twelve feet long. The net is suddenly thrown in front of a bird, flying as above described, which being unable to avoid it by turning flies directly into it.

The remaining species belong to the genus *Fratercula*, of which the Common Puffin (*F. arctica*) inhabits the North Atlantic, ranging south in winter on the American side to New Jersey, and to the Canary Islands on the European side. It breeds more or less abundantly on the Bird Rocks in the Gulf of St. Lawrence, and in almost incredible numbers on St. Kilda, the famous bird rocks of the

TUFTED PUFFIN
(*Lunda cirrhata*)

English coast. When the conditions permit they dig a burrow for themselves, which is three or four feet in length and lined at the end with dry grass and feathers, and woe betide the incautious person who thrusts a hand in to disturb the setting bird. "Never," says Mr. F. M. Chapman, "have I seen anything in the shape of a bird so diabolically vicious as a Puffin. An individual which we captured alive and attempted to study in our workroom, proved altogether too fierce a creature to have about." The Large-billed Puffin (*F. a. naumanni*), which differs in its large bill and generally larger size, inhabits the coasts and islands of the Arctic Ocean from Spitzbergen to Baffin's Bay, while the Horned Puffin (*F. corniculata*), so called from the presence of horn-like processes on the upper eyelid, is found in the North Pacific.

Auklets. — Confined to the North Pacific is a group of six species (referred, however, to four genera) of curious miniature Auks known as Auklets or Pygmy Auks, some of which are hardly larger than Sparrows. They are distinguished from the Puffins by the fact that the terminal portion of the upper mandible is not transversely grooved, and the inner claw is of the same size and shape as the others. Of these the Whiskered Auklet (*Simorhynchus pygmæus*) is perhaps the prettiest species of the whole family, being glossy blackish slate-color above and lead-colored below; the length is between seven and eight inches. The head is ornamented with an erect, graceful, recurving crest of narrow, dull black plumes about one and a half inches in length, besides a series of slender, pointed white feathers commencing beneath the eye and extending backward across the ear-coverts. They breed abundantly on many islands in Bering Sea, placing the egg in deep holes and crannies among the rocks.

Fig. 136. — Parrot Auklet, *Cyclorrhynchus psittaculus*.

Closely allied is the Crested Auklet (*S. cristatellus*), which has the same recurved frontal crest but is of larger size, reaching the length of ten inches, and in addition has several deciduous plates on the broad portion of the bill, which are cast off after the nesting season. Smallest of all is the Least Auklet (*S. pusillus*), which is only five and a half to seven inches long. It lacks the frontal crest of the others, but has a curious knob on the base of the bill which falls off after the young are reared. This species is especially abundant on the Pribilof Islands, where it occurs actually in millions during the breeding season, and constitutes one of the most marvelous aggregations of bird life in the world. "I can only compare their numbers to an apiary," says Mr. William Palmer,

"when the hives are placed, for acres, about fifty feet apart. Now, imagining that all these hives swarm at once, that each bee is larger than a Swallow and flying in an almost straight line, each about its own business, we may then have some idea of what can be seen every summer evening about seven o'clock on the west side of the village of St. George." They begin to arrive with great regularity each year about May 1st or 4th, and by June 1st or 6th have come in such numbers as to suggest to Elliott the swarms of locusts that sometimes infest the western plains. They frequent the loose stony reefs and boulder-strewn bars of the island, making no nest, but depositing the single egg deep down among the loose rocks or deep within the crevices and chinks in the faces of the cliffs. "To walk over their breeding grounds at this season," Mr. Elliott says, "is highly interesting and most amusing, as the noise of hundreds and thousands of these little birds, which are directly under your feet, gives rise to an endless variation of volume of sound as it comes up from the stony holes and caverns below." The males leave early in the morning for their feeding grounds far out to sea, where they secure their food of small water-shrimps and sea-fleas, and returning in the evening bring food for the young, and, it is thought probable, for their sitting partners as well.

Murrelets. — Passing now to the second subfamily, brief mention may be made of the so-called Murrelets, the eight species of which are disposed among three genera, and all occurring in the Pacific, though not reaching so far north as those last considered. They are for the most part slightly larger than the Auklets, approximating ten inches in length, and have a short, slender, compressed bill and a rather plainly colored plumage, without ornamental crest of any kind. It is possible that certain portions of the bill may be shed annually, as in the forms previously described, but this point is not satisfactorily settled.

Murres. — Approaching rather closely to the Razor-billed Auk in structure, plumage, and habits are the Murres and Guillemots, each represented by four or five species and subspecies. The Murres (*Uria*) are easily distinguished from the typical Auks by possessing a narrow bill destitute of grooves, and from the Guillemots in having the nostrils completely concealed within a dense, velvety feathering. Both are represented in the North Atlantic and North Pacific.

The Common Murre (*U. troille*) may be selected as the type of this group. It is about sixteen inches long and has the upper parts a rich velvety brown and the lower parts pure white, with a small spot of white on the wings. It is found on the coasts of the North Atlantic, nesting on the American side from Nova Scotia northward and ranging south in winter to southern New England and to the Mediterranean on the European side. During the nesting season they assemble by hundreds or frequently thousands, in suitable locations such as cliffs, rocky islands, and bold shores, where they rear their young, often in company with various other species. "Notwithstanding the immense numbers that sometimes resort to the same rock," says Dr. Brewer, "there is a freedom from confusion and a prevalence of order and system in their operations that

is quite remarkable. As by mutual and common consent, not only do the different species keep apart, and occupy separate portions of their breeding ground, but each individual bird apparently knows its place and keeps to it, going at once to its own chosen spot to renew its eggs when the nest has been despoiled of its treasure." The Murres make no nest, but lay the single very large egg on a bare rocky shelf. In shape the egg is of an elongate pear form, a configuration, it is said, that is a wise provision of nature for preventing the egg from being knocked or easily rolled from the ledge when the bird is suddenly startled, as when a gun is fired near the "rookery." The egg, being of this pear shape, simply rolls around in a circle if there fortunately be sufficient room, instead of rolling directly off, as, for example, the egg of a domestic fowl would be inclined to do. In color the eggs are extremely variable, hardly any two being alike. They vary in ground color from ivory-white to yellowish green, dark green, pale blue, and reddish brown, or even almost black, while the markings of black and brown are equally variable. This variation in color perhaps explains the reason for each bird recognizing its own egg so readily. According to Nuttall, the bird is so solicitous for its egg that it may "be seized by the hand or killed on the spot without flying from its favorite cliff." Incubation, in which both parents take part, occupies four weeks, and it seems to be pretty well authenticated that when the young are only partially grown and still unable to fly, they are carried down to the sea on the backs of the old birds.

Distinguished by a slightly shorter bill and rather darker head is Brünnich's Murre (*U. lomvia*), which inhabits the coasts of the Arctic Ocean and North Atlantic, ranging somewhat southward in winter, while its larger race, known as Pallas's Murre (*U. l. arra*), is found along the coasts and islands of Bering Sea and the Aleutian Islands. This splendid bird, the *Arrie* of the natives in imitation of its harsh note, breeds in countless thousands on the Pribilof Islands, its single egg being large and very fancifully colored, — a blue, green, whitish, or grayish ground, shot with dark brown mottlings and patches. At the risk of prolixity we quote extensively from Mr. Elliott's entertaining account of them in their summer home on St. Georges Island. "They lay their eggs upon the points and narrow shelves, on the faces of the cliff fronts to the island, straddling over their eggs, side by side, as thickly as they can crowd, making no nests. They quarrel desperately, but not by scolding; it is spirited action, and so earnestly do they fight, that all along below the high bluffs of the north shore of St. George, when I passed thereunder during the breeding season, I stepped over hundreds of dead birds which had fallen and dashed themselves to death upon the rocks while clinched in combat with their rivals. . . . Their curious straddling, whereby the egg is warmed and hatched, lasts nearly twenty-eight days, and then the young comes out with a dark, thick coat of down, which is supplanted by the plumage and color of the old bird in less than six weeks. They are fed by the disgorging parents, seemingly without a moment's intermission, uttering all the while between the gulps a hoarse, harsh croak, lugubrious enough." Of the curious "dress-parade" of the males which takes place daily after the females have begun to sit over the eggs, he says: "At regular hours in

the morning and in the evening, the males go flying round and round the island, in great files and platoons, always circling against or quartering on the wind; and they make in this way, during a sustained period of hours at a time, a dark girdle of birds more than a quarter of a mile broad and more than thirty miles long, flying so thickly together that the wings of one fairly strike those of the other; and as they go, they whirl in swift, revolving, endless succession, during the periods just mentioned." Mr. Palmer, who visited the islands more than twenty years after Mr. Elliott, states that his account of these birds is as true to-day as it then was, and after careful observations and computations is of the opinion that in 1898 there could hardly have been less than 9,000,000 birds in evidence.

Guillemots. — Sometimes placed in the same genus with the last, but distinguished as already pointed out by the exposed nostrils, are the Guillemots (*Cepphus*), of which there are five recognized species. Of these the Black Guillemot, or Sea Pigeon (*C. grylle*), may be selected for brief mention. Between twelve and fourteen inches in length, it is sooty black throughout, being somewhat lighter below, and with a large white patch covering the greater part of the wing-covert area. This species finds a home in the North Atlantic, retiring in winter as far south as the New Jersey coast on the American side and to northern Europe on the opposite side. It is ordinarily a rather shy, wary bird, not permitting a very close approach, though in Cumberland Sound the late Mr. Kumlien found it quite tame, yet it was next to impossible to shoot one in the water if the bird was watching, as it could dive as quickly as a Loon. It nests in the crevices and fissures of cliffs and rocky bluffs, laying two, or rarely three, large, heavily spotted eggs. It feeds largely on fish. Similar to this but having the under surface of the wings dark instead of white, is the Pigeon Guillemot (*C. columba*) of the Pacific coast of North America.

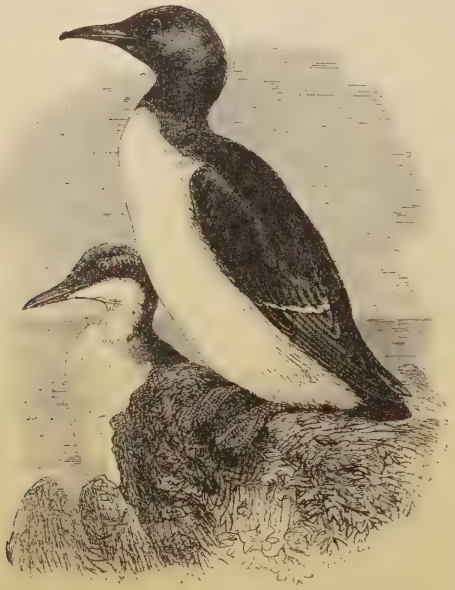


Fig. 137. — Black Guillemot, *Cepphus grylle*.

The **True Auks**, found only in the North Atlantic, are represented by three species, each placed in a genus by itself. Two of them, the Razor-bill and the extinct Great Auk, are characterized by a very deep and much-compressed bill,

with one or both of the mandibles transversely or obliquely grooved, while the other, known as the Dovekie or Sea Dove, has the bill very short and broad and is otherwise very distinct.

Great Auk, Garefowl. — Of these the Great Auk, or Garefowl (*Plautus impennis*), was in very many respects the most interesting, its sad and untimely fate having invested it with a pathetic not to say melancholy history. It was not only the largest of the family, attaining a length of from twenty-eight to thirty inches, but was the only North American bird incapable of flight, its wings being so much reduced as to be incapable of sustaining it in the air, although made use of in propelling it through the water. In coloration of plumage it was uniform black above and pure white beneath, with a broad patch of white on the wings, while in summer the chin, throat, neck, and sides of the head became velvety dark brown, and a large oval patch of white appeared between the bill and eyes. The home of the Great Auk was the North Atlantic south of the Arctic Circle, ranging on the American side from Labrador to Virginia, or perhaps exceptionally as far as Florida, where bones have recently been found in aboriginal shell heaps, and on the European side from Iceland to the Bay of Biscay. The last one appears to have been killed on the American side in 1842, and on the European side about 1844. The following account was written by Thomas Nuttall, one of America's pioneer ornithologists, long before their extermination: "Deprived of the use of wings, degraded as it were from the feathered ranks, and almost numbered among the amphibious monsters of the deep, the Auk seems condemned to dwell alone in the desolate and forsaken regions of the earth; yet aided by all-bountiful nature, it finds means to subsist, and triumphs over all the physical ills of its condition. As a diver it remains unrivaled, proceeding beneath the water, its most natural element, almost with the velocity of many birds through the air. It thus contrived to vary its situation with the season, migrating for short distances, like the finny prey upon which it feeds. In the Faroe Isles, Iceland, Greenland, and Newfoundland these birds dwell and breed in great numbers. They nest among the steepest cliffs of islands, remote from the shore, taking possession of caverns and clefts of rocks; or they dig for themselves deep burrows in which they lay their only egg, about the size of that of the Swan, whitish yellow, marked with numerous lines and spots of black which present to the imagination the idea of Chinese characters. They are so unprolific that if their egg be taken away, they lay no other that season."

The Great Auk appears to have bred at one time in great numbers on St. Kilda, various islands and skerries of the Hebrides, as well as at Orkney and Shetland, and was rarely met with along the shores of Norway and Sweden. In prehistoric times it frequented the fjords of Denmark, as its remains have been found in the Danish kitchenmiddens, but its last stand on the European side was made on several small rocky islands near Iceland, from which the last pair was taken, as above stated, in the summer of 1844. Funk Island, off the Newfoundland coast, appears to have been the last home of this bird in America. Here they were found nesting in great numbers when the island was first visited about 1534,

and during the succeeding period of three centuries they were subjected to continual persecution and eventually disappeared at about the same time as on the other side of the Atlantic. As they were helpless on land they were easily killed by the fishermen and hunters, who visited the island for the purpose, and it is of record that they were driven aboard vessels in hundreds across sails or planks stretched from the gunwales to the shore. Their eggs were also taken for table use, but it was not apparently until some one thought of killing them for their feathers that they were really doomed. Mr. Lucas, who visited Funk Island in 1887, found indications of the stone pens in which the birds were confined before slaughter, as well as heaps of bones where their bodies had evidently been thrown after being plucked. Probably within a comparatively few years after this form of persecution was begun the last were driven from the island, and being unable to establish themselves in another suitable location, were pushed to the wall. All that remains to-day of the Great Auk are about seventy skins, sixty-five eggs, and some twenty-five more or less perfect but composite skeletons, that is, skeletons made up from the bones of many different individuals.

The **Razor-billed Auk** (*Alca torda*) is a much smaller bird than its relative, being only fifteen to eighteen inches in length. In summer the plumage is sooty black above, brownish on the fore neck, and white below, with a white wing-bar and a line from the eye to the bill, the latter crossed in the middle by a white band. The winter coloration is similar except that the sides and front of the neck are white. The wings are well developed and it flies strongly and well. The Razor-bill occurs on the coasts and islands of the North Atlantic, ranging south on the American side to southern New England or occasionally as far as Virginia and North Carolina, and on the European side as far as Gibraltar; it breeds mainly to the northward. Their lives are passed for the most part on the open sea, on which they sit high and float buoyantly like a Duck, and they also fly like diving Ducks with rapidly beating wings and in a line, one bird behind another so close as to be almost touching. Their food consists largely of small fish which they secure by diving, using at the time their wings as well as their feet for propulsion. At the nesting period they congregate often by thousands, together with Guillemots and Puffins, about some bald headland or precipitous rocky cliff, and deposit the single, large, handsome egg on the bare ledge of rock. Both birds take part in incubation, sitting over the egg in an upright position and with the head facing the wind.

The **Dovekie**, or **Sea Dove** (*Alle alle*), is known by its small size, attaining a length of only about eight inches, and by its short, broad bill in which the angle of the chin is much nearer the tip than the nostril. The plumage is black above, with the secondaries tipped and the scapulars streaked with white and white below, the flanks being striped with dusky. It is a native of the Arctic Ocean and the coasts of the North Atlantic, coming south in winter as far as the Azores. The single bluish white egg is deposited on a rocky ledge or crevice in a cliff.

II. PTEROCLO-COLUMBÆ

The second of the two superior groups into which the Plover-like birds are divided embraces the Sand Grouse and the multitudinous Pigeons, and comprises what Dr. Gadow has called the *Charadriiformes* in their widest sense. They are distinguished from the group of *Laro Limicolæ* by the naked or sometimes entirely absent oil-gland, a rudimentary vomer, impervious nostrils, and a much larger crop. The first to be considered are

THE SAND GROUSE

(Suborder *Pterocles*)

The Sand Grouse, or Pigeon-Grouse as Huxley very appropriately called them, are a small but very peculiar and interesting group of birds that seem to combine in a measure the characters of several orders. They are small Grouse-like or Pigeon-like birds, approximating ten or twelve inches in length, with a rather stocky body, long, pointed wings, and very short legs and toes. The bill, although not so strongly developed, resembles that of the Fowl like birds (*Galliformes*), and the digestive organs are galline, while the young present many characters that suggest the same type. On the other hand, they agree with the Pigeons in the vocal organs as well as in certain details of the skull, shoulder girdle, and sternum, but differ in the form of the legs and feet and somewhat in the feather pattern, and in possessing an aftershaft to the contour feathers. In certain features they even suggest the Plovers, while their eggs are not greatly unlike those of Rails; but they are said to drink like Pigeons, that is, "thrusting the bill up to the nostrils into the water, and retaining it there until the thirst is satisfied," and altogether they seem to be rather closer to the Pigeons, but forming, nevertheless, a very distinct group. They are comprised in a single family (*Pteroclidæ*), which embraces three genera and seventeen species, all confined to the Old World, with a few forms extending by migration into southern Europe.

To descend now to particulars, the Sand Grouse are as a rule birds of a yellowish brown or buff color, and generally possess four toes, although the hind toe is always small and in one genus is entirely absent; all the toes are on the same level, the front ones being short and rather broad. There are eleven primary quills in the wings and the tail is composed of from fourteen to sixteen feathers, the central ones being in some greatly elongated, while in others the outer primary is produced into a thin filament. In all the species the tarsus is covered with short, downy feathers and some have the toes feathered in addition.

The Sand Grouse frequent for the most part the great bare plains and deserts, such as those so well known in many parts of Africa and Asia, a few only coming to the border of the thin, bushy jungle, all, however, avoiding the dense forests and keeping mostly to the open places, where their quiet plumage well harmo-

Fig. 138. — Masked Sand Grouse, *Pterocles personatus*.

nizes with the soil, sand, and stones among which they live. Although supposed to be strictly monogamous, they are gregarious at all seasons, occurring sometimes in flocks of immense size, though usually seen in small companies or perhaps family parties. Their haunts are ordinarily at no great distance from water, to which they repair with great regularity at morning and evening, some being decidedly crepuscular, visiting the drinking places before dawn and after dark. They are shy, wary birds at all times, but especially so when visiting the water, and are said never to approach it without first surveying the ground for possible danger. Although they are somewhat awkward on the ground, due to their short legs and feet, they walk fairly well and manage to run with considerable rapidity, but on the wing they enjoy a strong, rapid, and very noisy flight. They all lie closely until flushed, and are very fond of basking in the hot sun in slight hollows scratched out for the purpose in the sand. The cry of the Sand Grouse is variously described as a piercing whistle, a twittering, or a di- or tri-syllabic clucking, the nature of the notes differing more or less with the various species; all cries are frequently uttered while on the wing. They are more or less pugnacious birds among themselves, the males frequently engaging in battle. The food consists of seeds, tender shoots, insects, and berries when obtainable, and they make no nest, or at most a very slight one, depositing the eggs, usually three in number, in a slight depression in the ground. The eggs are peculiarly shaped, being equally rounded at both ends, and in color are gray or greenish with double spotting of brown and reddish. Both parents take part in incubation, but they are not very solicitous for the safety of the eggs, as they are frequently left uncovered for some time while the sitting birds are away at the drinking places or feeding. The young are covered with a richly colored down, and are able to run about as soon as they leave the shell. Although ranked as game birds, they are not very highly esteemed for this purpose, as the flesh is hard and lacking in flavor.

The first genus (*Syrrhaptes*), characterized by the absence of the hind toe, as well as by the great elongation of the middle pair of tail-feathers, contains but two species, both of eastern Asia. Of these Pallas's Sand Grouse (*S. paradoxus*), a bird from twelve to fourteen and a half inches in length, may be known by the buff, or yellowish gray, vermiculated upper parts, a large black abdominal patch, rusty red throat, and a zone of white across the breast; the smaller female lacks the pectoral zone of black and white and is duller throughout. This species ranges from the Kirghis Steppes to central Asia, Mongolia, and northern China, and is the species which, under the guidance of an erratic and wholly unexplained impulse, sometimes invades western Europe in great numbers. Such incursions occurred notably in the years 1863 and 1888, a few even penetrating as far as the British Islands, where several pairs nested, as well as on the sand-hills of Holland, Jutland, and other localities, but the persecution was too great, and they failed to establish themselves. When they may come again, or if ever, or the causes which inaugurate the movements are wholly unknown.

The other member of this genus is the Tibetan Pin-tailed Sand Grouse (*S. tibetanus*), the largest of the family, reaching a length of nearly sixteen inches,

and known by the entirely white abdomen. It is a noisy bird, frequenting the barren and desolate steppes of Tibet at elevations between 12,000 and 18,000 feet, where it is commonly observed in parties of from three to twenty, though occasionally several hundred are seen together. Its nesting habits are little known.

Of the remaining genera, in both of which the hind toe is present, the first (*Pteroclurus*) is distinguished by having the two middle tail-feathers elongate and narrowly pointed, while in the typical Sand Grouse (*Pterocles*) these tail-feathers are normal. The Masked Sand Grouse (*P. personatus*) of Madagascar, the species selected for illustration, is so named from the presence of a broad black band surrounding the gape. It has the back uniform brown, and the belly rufous-buff closely barred with black; the length is eleven and a half inches.

THE PIGEONS

(Suborder *Columbæ*)

The Pigeons constitute a very large and varied group of nearly or quite five hundred species, and while there has been more or less disagreement as to their probable affinities and interrelationships, it is beyond question that they form among themselves a relatively compact body. They are strictly cosmopolitan and appear to have their center of distribution in the Australian region, where three fourths of the genera have representatives, and to which not far from two fifths of the whole number of species are confined. The reason for their maximum development in this region is probably to be explained by the fact that arboreal predatory animals, such as monkeys, lemurs, cats, weasles, etc., are entirely absent, for Pigeons are particularly weak and defenseless birds, building their rude nests in open situations where their eggs and helpless young are constantly exposed to danger. Their only enemies in this region are birds of prey, and perhaps for purposes of concealment from these sources the plumage is most frequently green above, but when they are largely relieved from even this danger, as on small islands, the plumage often becomes exceedingly brilliant with patches of blue, red, yellow, and green. In fact, as Wallace has pointed out, they seem to be especially adapted to conditions of island life, and if we group together the Pacific and Maylayan islands with those of the Mascarene group and the Antilles, we find that they contain nearly as many forms as all the great continents combined. The continental forms are largely arboreal in habit, but in localities where they are relieved from the ordinary dangers of terrestrial life they have commonly developed into ground-haunting forms; and in extreme cases, where all competition has been removed, they have developed into such gigantic flightless anomalies as the Dodo and Solitaire.

Structurally the Pigeons are four-toed birds with the hind toe on the same level as the others, and none of the toes are connected at the base by a membrane. The tarsi are covered at the sides and behind by hexagonal scales, and are usually more or less feathered on the upper part, although sometimes

entirely naked. The bill is swollen at the tip, which is hard and convex, and has the basal portion covered by a soft skin in which the slit-like (schizorhinal) nostrils open. The palate is of the slit-form (schizognathous), and the breast-bone is generally provided with four deep notches on its posterior portion, although sometimes it is very narrow and has but two notches. The oil-gland is naked or even wholly absent, and the cæca is generally rudimentary or in any event not functional, while the feathers are without an aftershaft or at most with a rudimentary one. The wings are usually long and strong with eleven quills, and the tail consists of from twelve to twenty feathers. "The Pigeons build a nest of very simple structure, composed of twigs and generally placed in a tree. The eggs are generally two, and constantly white, though some species lay only one egg. The newly hatched young are naked and altogether helpless, and for a time they are nourished with a secretion from the well-developed crop."

The Pigeons are divided into two families, in the first of which (*Dididæ*) the wing is rudimentary and wholly useless for flight, while in the second (*Columbidæ*) the wing is functional. The latter, in which is included all of the groups except the Dodo and Solitaire, is further divisible into some five subfamilies, as follows: The Tree Pigeons (*Treroninæ* and *Columbinæ*), the Ground Pigeons (*Peristerinæ*), the Crowned Pigeons (*Gourinæ*), and the Tooth-billed Pigeon (*Didunculinæ*). The characters on which each of these subfamilies is based will be set forth under the treatment of the several groups.

THE DODO AND SOLITAIRE

(Family *Dididæ*)

As already pointed out, the members of this family are distinguished at once from the typical or normal Pigeons by the almost complete abortion of the wing and the consequent loss of the power of flight. There are naturally also a number of important structural characters, but of these we may only mention the absence of basipterygoid processes and much-reduced furcula. The following entertaining account is quoted almost entire from Mr. F. A. Lucas: What the Brahma is among domestic fowls the Dodo (*Didus ineptus*) was to a far greater extent among the order of Pigeons, a grotesque, aberrant, and gigantic member of the group. The first mention of the Dodo was in an account of the voyage of the Dutch Admiral Jacob Cornelius Van Neck to Mauritius in 1598. The Dodo is there called Walchvogel, or disgusting fowl, partly on account of the toughness of its flesh and partly because even the best portions of the Dodo were poor in comparison with the tender meat of the abundant Doves. This curious bird was found only in Mauritius. Another closely related species, the Solitaire (*Pezophaps solitarius*), was found in Rodriguez, and probably a third member of the family at Bourbon, this last species being known only from the description of travelers, for not even a bone of it has ever come under the ken of naturalists. De Bry, the chronicler of Van Neck's voyage, says the

Walchvogel were "bigger than our Swans, with large heads, half of which is covered with skin like a hood. These birds want wings, in place of which are three or four feathers of a gray color."

For a better idea of the appearance of the Dodo we are indebted to the pictures of Roelandt Savary and his nephew John, Dutch artists of the first half of the seventeenth century, from whose paintings we gather that the Dodo was a heavy-bodied, short-legged bird, with disproportionately large head and huge,

Fig. 139. — Dodo, or Dronte, *Didus ineptus*. Facsimile of Piso's figure, made in 1658.

formidable-looking hooked bill. The body was sparingly clad in loose feathers, the wing-feathers alone being stiff, the tail resembling a small feather duster. The general color, as noted by De Bry, was gray, and the wings and tail yellowish or dirty white. The bird, so Cause tells us, laid a single egg "the size of a half-penny roll, in a nest made of herbs heaped together," the somewhat indefinite size ascribed to the eggs being qualified later on by comparison with that of the Great White Pelican, which it was said to resemble in size. Not being acquainted with mankind, the birds of Mauritius, like those of other uninhabited islands, were at first extremely tame, but the Dodo seems to have been not only unsuspicious but stupid into the bargain, a fact that rendered its extermination all the easier.

Although the discoverers of the bird seem to have thought poorly of its gastronomic qualities, the next vessel to reach this isle of plenty made sad havoc with the unfortunate Dodos. This was the ship of one William van West Zannen, who stopped there in 1601. He writes that "The Dodos, with their round sterns (for they are well fattened), were also obliged to turn tail; everything that could

FIG. 140. — Dodo, *Didus ineptus*. From painting by Roelandt Savary, early half 17th century.

move was in bustle; the fish which had lived in peace for many a year were pursued into the deepest pool." One day Zannen's crew took twenty-four Dodos, on another twenty, "so large and heavy that they could not eat any two of them for dinner." Other Dutch ships followed in Van Zannen's wake, feasting on tortoise and Dodo, and, salting down a store, departed, leaving the ranks of the Dodos sadly depleted. The last notice of the living Dodo occurs in "A coppey of Mr. Benj. Harvy's Journal when he was chief mate of the Shippe Berkley

Castle," which shows that he was in Mauritius in 1681 and saw "Dodos, whose flesh is very hard." In 1693, a little less than a century after its discovery, the bird seems to have become extinct, for Leguat, the careful describer of the Solitaire, makes no mention of the Dodo. Shortly after the Dodo became extinct the Dutch, who had so far been the occupants of Mauritius, left the island, and in 1715 the French took possession only to give place to the English in 1810, one result of these various changes being that all knowledge of the quaint and curious bird was so utterly lost as not even to live in tradition, while the few specimens preserved in museums were so little known that some naturalists became skeptical as to the previous existence of such a bird as the Dodo. But these doubts were set at rest when, in 1866, Mr. George Clark of Mauritius succeeded in obtaining a considerable series of bones from the bottom of a small marsh, known as the Mare aux Songes, lying about a quarter of a mile from the sea. At the beginning of the last century this marsh, as well as the land immediately about it, was still covered with large trees whose fruits had doubtless formerly served the Dodo for food, and in this spot the bird seemed to have lived and died in peace, and curiously enough this is the only place in Mauritius where its bones have been brought to light. Of specimens other than the bones there are only a few fragments, a head and foot in the Ashmolean collection at Oxford, a foot in the British Museum, and a head in the Museum at Copenhagen are all that remain.

The Solitaire, while presenting a general likeness to the Dodo, was somewhat more lightly built, and had decidedly longer legs and neck and a smaller beak. For a knowledge of the external appearance and habits of the Solitaire we are entirely dependent on the account of François Leguat, who in 1691 founded a colony at Rodriguez. His account in part is as follows: "Of all the birds on this island the most remarkable is that that goes by the name of the Solitaire, because it is very seldom seen in Company, tho' there are abundance of them. The feathers of the Males are of a brown gray Colour; the Feet and Beak are like a Turkey's, but a little more crooked. They have scarce any Tail, but their hind part covered with Feathers is roundish, like the Crupper of a Horse; they are taller than Turkey's. Its eye is black and lively, and its head without comb or cop. They never fly, their Wings are too little to support the weight of their bodies; they serve only to beat themselves, and flutter when they call one another. They will whirl about for twenty or thirty times together on the same side, during the space of four or five minutes. The motion of their Wings makes a noise very like that of a Rattle; and one may hear it two hundred paces off. The Bones of their Wing grow greater toward the Extremity, and forms a little round mass under the Feathers, as big as a Musket Ball. That and its beak are the chief Defense of this Bird. 'Tis very hard to catch it in the Woods, but easy in open Places, because we run faster than they, and sometimes we approach them without much Trouble. From March to September they are extremely fat, and taste admirably well, especially while they are young. Some of the Males weigh forty-five Pounds.

"Though these Birds will sometimes very familiarly come up near enough to one, when we do not run after them, yet they will never grow Tame. As soon

as they are caught they shed Tears without Crying and refuse all manner of Sustenance till they die.

"When these Birds build their Nests, they choose a clear Place, gather together some Palm-Leaves for that purpose and heap them up a foot and a half high from the Ground, on which they sit. They never lay but one Egg, which is much bigger than that of a Goose. The Male and Female both cover it in their turns, and the young which is not able to provide for itself in several Months, is not hatched till a seven Week's end. All the while they are sitting upon it they will not suffer any other Bird of their Species to come within two hundred Yards round of the Place; But what is very singular, is, the Males will never drive away the Females, only when he perceives one he makes a noise with his Wings to call the Female, and she drives the unwelcome Stranger away, not leaving it till 'tis without her Bounds. The Female does the same as to the Males, and he drives them away. We have observed this several Times, and I affirm it to be true.

"The Combats between them on this occasion last sometimes pretty long, because the Stranger only turns about, and do's not fly directly from the Nest. However the others do not forsake it till they have quite driven it out of their Limits. After these Birds have raised their young One, and left it to itself, they are always together, which the other Birds are not, and tho' they happen to mingle with other Birds of the same Species, these two Companions never disunite. We have often remarked that some Days after the young one leaves the Nest, a Company of thirty or fourty brings another young one to it, and the new fledg'd Bird, with its Father and Mother joining with the Band, march to some Bye Place. We frequently followed them, and found that afterwards the old ones went each their own way alone, or in Couples, and left the two young ones together, which is called a *Marriage*."

The date of the final disappearance of the Solitaire is not known, though it appears to have been living as late as 1729 but in greatly reduced numbers. So early as 1789 its bones were discovered in certain limestone caves and since that date, but principally about 1865, large additional deposits were found consisting altogether of several thousand bones, including a number of complete skeletons; with the result of confirming, so far as the anatomical structure goes, all of Leguat's statements, and making it probable that his account was in the main correct.

THE TRUE PIGEONS

(Family *Columbidæ*)

The Tree Pigeons.—The members of the first subfamily from their arboreal habits may be collectively known as the Tree Pigeons, although the various minor groups are known respectively as Green, Painted, Wart, and Fruit Pigeons. They number about two hundred and twenty-five species disposed among some thirty-seven genera and three groups (formerly called subfamilies),

and enjoy a very wide but exclusively Old World distribution, being especially abundant in Africa, southeastern Asia, and the islands of the Eastern Archipelago, with a few extending to Australia, Tasmania, and New Zealand. They may be known from the other members of the suborder by the rather short legs in which the tarsi are generally shorter than the middle toe, and feathered for more than half their length, while the soles of the feet are very broad, each toe having the skin expanded on the sides. With the exception of two or three genera the tail is composed of fourteen feathers.

Green Pigeons. —The present subfamily, as above stated, may be divided into three fairly well marked groups, in the first of which, the so-called Green Pigeons (*Treroninæ*), the bill is relatively thick and the general plumage green, relieved for the most part with a band of yellow on the wings. The first that we may consider are the Wedge-tailed Green Pigeons (*Sphenocercus*), so called from the fact that the tail is wedge-shaped, with the central feathers usually more or less pointed. Eight species are now known, these ranging from northern India to Japan and through Burma to Java. The only one that we may mention, which may be taken as typical of the others, is the so-called Kokla (*S. sphenurus*), a bird about thirteen inches in length, in which the central tail-feathers are relatively short and not acuminate. It has the general greenish yellow plumage of the group and is distinguished from the nearest related forms by the fact that the under tail-coverts are of a uniform lighter gray instead of black. According to Hume the Kokla breeds throughout the outer ranges of the Himalayas south of the first Snowy Range, at elevations of from 4000 to 7000 feet, coming in April and leaving by or before November, migrating often in immense numbers, to the eastward. The nest is a slight platform of sticks usually placed in high forest trees, and the eggs are the usual two and pure white. It feeds on fruits and berries, a continued supply of which it seeks in the warm countries whither it migrates.

In the next three genera the feathers of the tail are nearly even, or with the outer ones very little shorter than the others, while the third primary is always scooped out on the inner web. Of these the genus *Vinago* with eight species is entirely confined to Africa, ranging from Senegambia and Abyssinia to the Cape and also Madagascar. The various species may be known by the conspicuously yellow feathers of the legs, while in addition some of them have the forehead more or less naked.

The **Indian Green Pigeons** (*Crocopus*) of the Indo-Chinese countries agree with the last in the form of the tail and the yellowish leg-feathers, but differ in having the first three primaries more or less pointed. Of the three species the Bengal Green Pigeon (*C. phœnicopterus*), a bird about twelve and one half inches in length, has the plumage greenish and grayish, with a well-defined green band at the base of the tail. Although found to some extent in various parts of India, it is only at home in Bengal, while the Green-fronted Pigeon (*C. viridifrons*), a similar but slightly larger species, is found throughout India and Cochin China, being replaced in the Indian peninsula and Ceylon by the Southern Green Pigeon (*C. chlorogaster*). The Indo-Chinese countries are also the home of another

group of these Pigeons (*Osmotreron*), numbering no less than nineteen species, which are distinguished from the others just mentioned by having the tibial feathers greenish or whitish instead of yellowish. In the three remaining genera of the subfamily the sheath of the upper mandible reaches the feathers of the forehead. Of these *Butreron*, with a single species (*B. capellei*), is found in the Mergui Archipelago, Malay Peninsula, Sumatra, Borneo, and Java. *Treron* with two forms, is widely spread from the southeastern Himalayas to the Philippines; and *Phabotreron*, with nine species is confined to the Philippine Islands. The latter, marked by possessing a tail of only twelve feathers, are handsome small birds under ten inches in length, with a plumage mainly of chocolate-brown.

Painted Pigeons. — The two remaining groups of Tree Pigeons are distinguished from the first by a much thinner bill and by the absence of the conspicuous yellow band across the wing at the tips of the greater upper wing-coverts. In the first of these groups — the *Ptilopodinæ* — the birds are of small size, with a rather short bill which is not especially distensible at the base as in the other groups, and the plumage is mostly green, though generally much variegated with patches of different colors, often producing very beautiful and striking contrasts. Of the seventeen genera and one hundred species included in this group, we can mention but few, among them, of course, the beautiful Painted Pigeons, which to the number of seventy-five species were formerly included in the genus *Ptilopus*, but which are now disposed among a dozen or more genera. As a whole, the Painted Pigeons may be known by having the plumage generally green, or in any case not entirely deep blue, while the primaries are not divided at the tip, nor are their inner webs either yellow or orange-yellow. To convey some idea of their great beauty a few species may be briefly described. Thus the Jamboo Pigeon (*Leucotreron jambu*) of the Malay Archipelago, a bird about ten inches in length, is shining bronze-green above, with the head deep crimson, this color extending from the front to the middle of the crown, behind the eyes and across the ear-coverts to the throat, while a brownish chestnut stripe runs down the chin and middle of the throat, with a spot behind the ears, the sides and front of the neck pure white, which passes into buffy white along the sides of the breast and the whole of the abdomen, contrasting with the middle of the breast, which is a beautiful pink. To complete the picture it may be added the bill is bright yellow and the feet dark red. The female is similar but smaller, the colors being duller and the breast grayish green. In the genus *Ptilopus* as at present restricted the tail is of moderate length and the wing is rather long, while the head possesses a well-defined cap. In Grey's Painted Pigeon (*P. greyi*) of New Caledonia and near-by islands, the upper parts are bronze-green, the upper part of the head purple-rose or magenta, margined behind with yellow, while the chin and throat are yellowish, the breast grayish green, the middle of the abdomen dull purple, and the lower abdomen purple tinged with orange. The bill is green with a gray tip and the feet dull crimson. In *Lamprotreron*, a genus of two species, ranging from Celebes through the Moluccas and the Papuan Islands to Australia, the wing is short and there is a broad band of blue-black separating the breast from the abdomen. In *L. superba*, the Superb Fruit

Pigeon, the cap is purple-violet, "the occiput and sides of the head olive-green, sides and back of the neck bright rufous; back, rump, and upper tail-coverts, scapulars, and wing-coverts green; scapulars, inner greater wing-coverts, and inner secondaries with deep blue spots near the tip; smaller wing-coverts near the bend of the wing deep blue; quills black, the primaries with narrow outer yellow edges; chin and greater part of the cheeks pale gray; breast pale gray with the base of the feathers purple; below the breast a broad black band, more or less tinged with blue or green; abdomen white, the flanks green with two white bands; under tail-coverts white with a longitudinal green spot on the inner web and tinged with pale yellow on the apical edge; bill olive-green with the tip yellowish, the feet rose-color." As Gould well says: "the hues of no other feathered creature can surpass newly moulted individuals of this bird." Almost equally beautiful are many of the others, but of these we may only mention the exquisite little Eugenia's Pigeon (*Ionotreron eugeniæ*) of the Solomon Islands. About eight and one half inches long, the upper parts are bronze-green, with the head pure white, the throat and chest purple-red surrounded by a dull purple band, while the bend of the wing, as well as several spots along the coverts, is light gray, and the under parts are grayish green, becoming whitish on the abdomen.

Confined to the Fiji Islands is a group of these species belonging to the genus *Chrysœnas*, which are characterized by having the inner webs of the flight-quills yellow or orange-yellow. Of these perhaps the most beautiful is *C. victor*, a bird only about seven inches in length, in which the general plumage of the male is bright orange, with the head and throat olive-yellow, and the bill and feet green. In the female the entire plumage is rich green, yellowish and lighter on the head and throat, and with the bill and feet mainly black. In C. *viridis* the general plumage of the male is dark green with a golden gloss on back and breast and greenish yellow on head and neck, while the female is plain green. Both these species are about seven inches in length.

Wart Pigeons. — Very striking birds are the so-called Wart Pigeons (*Alectrœnas*), the four living species being confined to the Madagascarian subregion, but there was also a fifth species in the Mauritius which has become extinct within historic times. They are larger than those last considered, being from nine to nearly twelve inches in length, and have the plumage mostly a deep blue, with the feathers of the neck deeply bifurcated and hackle-like in appearance. They take their name of Wart Pigeons from the presence of wattles on the sides of the forehead. In the Red-crowned Wart Pigeon (*A. pulcherrima*) the plumage is black with blue reflections, the feathers of the crown being hair-like and carmine in color, while the sides of the head, neck, and upper breast are gray, and the naked skin around the eyes as well as on the wattles is red. In the Madagascar Wart Pigeon (*A. madagascariensis*) the general color is indigo-blue, with the throat and neck slaty gray, becoming blue on the forehead, while the tail and its upper coverts is dark crimson glossed with blue or green at the base. These birds are mainly arboreal, feeding on dates, figs, berries, and grain, and are strong of wing.

Distinguished from all the other members of this group by having the under wing-coverts yellow, is a genus (*Megaloprepia*) of six handsome species ranging from the northern Moluccas through the Papuan Islands to Australia. They are strictly arboreal in their habits, feeding entirely on fruits, berries, and seeds, and frequenting especially the lofty fig-trees and palms. Of the two species inhabiting Australia the Magnificent Fruit Pigeon (*M. magnifica*) is, according to Gould, the most splendid Pigeon known from that country. It is about sixteen inches long, the head and neck being pale gray, with the remainder of the upper parts as well as the wings a rich golden green; there is an irregular band of light yellow across the wings, and the tail is a deep, bronzy green, while a line down the throat and the whole of the breast and abdomen is a rich deep purple, the under surface of the shoulder, the thighs, and vent deep gamboge-yellow. They are rather shy birds of quiet habits and not easily discovered unless they utter their loud, hoarse call, which is quite unlike that of any other bird. They feed entirely on the wild fig and nutlike fruits of the various large palms. The sexes are similar in plumage, though the female is somewhat smaller. In northeastern Australia this gives place to the Allied Fruit Pigeon (*M. assimilis*), a species of similar plumage, but only about fourteen inches in length; while in central New Guinea there is a still smaller form (*M. poliura*) that is scarcely thirteen inches long. The final member of this group to be mentioned is the New Caledonian Pigeon (*Drepanoptila holosericea*), which is distinguished by having the primaries curiously divided at the tip and the legs entirely feathered; it is confined to New Caledonia and the Isle of Pines.

Fruit Pigeons. — The true Fruit Pigeons comprising the group *Carpophaginæ* number about seventy-five species, disposed in eleven genera. They are birds of large size, some of them indeed being among the largest of the family, agreeing with the last group in the rather thin bill and the absence of a yellow wing-band, but differing from them in the generally longer bill which is very distensible at base, thus permitting them to swallow fruits of large size. The plumage is not so variegated as in their relatives just described, and in all but one of the genera the tail consists of fourteen feathers, the exception (*Hemiphaga*) having but twelve, and in all but one the head is without a crest.

The first that we may mention is a monotypic form (*Serresius galeatus*) from the Marquesas Islands, distinguished by having the feathered skin on the forehead of a saddle-like shape and covering half the bill. The plumage is dark shining green above, with head, neck, and lower parts dark gray. The possession of a fleshy knob at the base of the bill characterizes the genus *Globicera*, which embraces eight species of the Polynesian and the Papuan islands. Several of the species are confined to single islands and are only known from the type specimens collected some sixty years ago. But little is known of their habits and it is not improbable some of them may now be extinct.

The typical Fruit Pigeons to the number of more than fifty species were formerly comprised in the genus *Carpophaga*, but by elevating what are sometimes considered subgenera to full rank, the number in this genus has been reduced to about twenty-five. In these the general plumage is mostly metallic on the upper

parts, while the tail is of uniform color and the inner primaries of normal shape. As the appearance and habits of the various species is quite similar it may be necessary to describe only two of these forms. Thus the Nicobar Fruit Pigeon (*C. insularis*), a bird some eighteen or nineteen inches long, has the head, neck, upper mantle, breast, and abdomen gray, while the back, rump, and wings are dark metallic green, and the under tail-coverts dull chestnut. The Imperial Fruit Pigeon (*C. ænea*), which is widely spread through the Indian peninsula, Ceylon, the Indo-Chinese countries to the Malay Peninsula and the Philippines, is about seventeen inches in length, with much the same coloration as the last except that the under tail-coverts are deep chestnut. Certain other species, such as *C. rosacea*, have more or less of a vinous color over the upper parts and breast.

The genera formerly included in *Carpophaga* may be briefly enumerated. Thus *Ptilocolpa* of the Philippine Islands may be known by having the first primary much scooped on the inner web, and the plumage grayish green above with the crop region ashy gray or coppery, and the breast and abdomen some shade of chestnut. Three species are known. The group of nine species referred to *Zonophaps* have the upper plumage metallic golden green, often more or less purple or coppery, and the tail with a gray band near the tip or middle. In *Ducula*, the seven species of which range from India through the Burmese countries and the Malay Peninsula to the Sunda Islands, the tail is rather long with a broad light band at the tip, while the inner primaries are broad and obliquely cut at the extremity. Quite distinct from all these is the monotypic *Cryptophaps pœcilorrhoa* of the northern Celebes, which may be recognized by the naked lores and a white band at the tip of the tail, the general color being shining black, glossed with olive-green. In the last genus (*Zonœnas*), which includes eight species, all of the Papuan Islands, the lores are feathered, but there is a broad naked band surrounding the eye, and the plumage is slate-gray or slate-black.

Nutmeg Pigeons. — Passing over the genus *Phœnorhina* with its single very large species (*P. goliath*) confined to New Caledonia, we may mention the Nutmeg Pigeons (*Myristicivora*), in which the general plumage is white or creamy white, with the wings and tail mainly black or slate-gray. Of these the Pied, Imperial or White Nutmeg Pigeon (*M. bicolor*) is one of the handsomest. It is about sixteen inches long and creamy white except the primaries, secondaries, and the terminal half of the middle tail-feathers, which are black. This species has a wide range from the Andamans and Nicobars through the Malay Archipelago to New Guinea, being for instance very abundant on the Nicobars, where it occurs in great numbers. It keeps much to the mangrove swamps, feeding entirely on fruits and having the habits of the true Fruit Pigeons. The nest is the usual rude platform of sticks, placed in the mangroves, wherein a single white egg is laid sometime between January and March. In New Guinea and northern Australia the place is taken by a closely related form (*M. spilorrhoa*), which differs in having certain of the under parts with black spots. It lives entirely among the branches of the highest trees, feeding especially on the fruits

of the wild nutmeg, but also on other fruits and berries. It is often seen in immense numbers, but is difficult to approach except at night, when it resorts to the mangrove swamps to roost. It also builds its nest among the mangroves, having a preference for those overhanging the water, and like its near relative appears to lay only one egg.

The **Top-knot Pigeon** (*Lopholæmus antarcticus*), distinguished at once by its conspicuous crest, is confined to eastern Australia and Tasmania, where in places it is very abundant. About fifteen inches in length, it has the general plumage gray, with the sides of the head and the occipital portion of the crest rust-red, while the iris is fiery orange, the bill rose-red, and the feet grayish brown. It is strictly arboreal, never descending to the ground or even to low, shrub-like trees. It feeds entirely on fruits, such as the wild fig and the berries of the cabbage palm, and may often be seen visiting its feeding grounds in flocks of many hundreds.

New Zealand Wood Pigeon. — Of the last genus (*Hemiphaga*), characterized as already pointed out by the tail of twelve feathers, we may only mention the New Zealand Wood Pigeon (*H. novæ-zealandiæ*) of New Zealand and the Auckland Islands, the other two species of the genus being confined to Norfolk and Chatham islands. It has a total length of about twenty-one inches, the plumage being coppery purple above and white below, with the head, neck, and breast coppery green, and the tail greenish black. Like its relatives, it is strictly arboreal, preferring the densest foliage, where it seeks its food of various fruits, berries, and tender shoots. At certain seasons it is much esteemed for food by the natives and is snared or speared often in large numbers; but as its flesh is affected by the nature of its food, it is only taken when it is known to be eating certain fruits, such as the so-called ti-palm.

The Wood, Long-tailed, and Passenger Pigeons (Subfamily *Columbinæ*). — The members of the present family agree with those of the last in having the tarsus generally shorter than the middle toe, but they differ from them in having the soles of the feet normal, that is, the skin is not expanded along their sides except that of the hind toe, which is thus expanded, while the tail is uniformly of twelve feathers. They number about one hundred and ten species, distributed among some ten genera and three fairly well marked groups, in the first of which the tail is shorter than, or at least not longer than, the wing. Passing over the genus *Gymnophaps* with which its single species (*G. albertisii*) is confined to New Guinea, we come to the typical genus *Columba*, with its more than seventy universally distributed forms, among them the Rock Dove (*C. livia*), from which the domestic breeds of Pigeons have come. They are compactly built birds, mainly under fifteen inches in length, with the tarsus never feathered for more than half its length, generally much less, while the first primary is considerably longer than the sixth. Of the vast number of forms the United States possesses but three, the best-known being the **Band-tailed Pigeon** (*C. fasciata*) of the western United States from the Rocky Mountains to the Pacific coast, whence it ranges south through Mexico to the highlands of Guatemala. It is lead-colored above, becoming browner on the back and bluish on the rump,

with the terminal third of the tail lighter in color than the basal portion, the two being separated by a blackish band. In the male there is a narrow half collar of white on the hind neck, the remainder of which is a dull metallic bronzy green, while the fore neck and lower parts are purplish gray or grayish violet, becoming more pinkish on the abdomen. The female is similar but duller and has the collar indistinct or even obsolete. This Pigeon appears to be rather locally distributed, being abundant in some localities, as, for example, near the mouth of the Columbia River, and occurring sparingly in others, but differing in abundance from year to year as its food supply changes. It feeds very largely on acorns, but also on various berries, such as those of the elderberry (*Sambucus*) and salmon-berry (*Rubus*), and during seasons when the crop of acorns or berries is scanty it may be almost absent, only to return the next season in increased numbers. Their cooing resembles that of the domestic Pigeon and the young are fed in the same manner. The breeding season appears to extend over much of the year, except in the northern portion of its range, when but one or two broods are reared. The nest is sometimes, though rarely, placed on the ground, usually in an oak or spruce from eight to ten feet from the ground, though exceptionally it has been found one hundred and eighty feet from terra firma. Occasionally they may make use of an old nest of some other bird, but when they construct one it is but a rude affair of a few sticks placed on a horizontal limb. In the southern part of its range, as in Arizona, it appears that only one egg is laid, but farther north two is the rule. It seems to be established beyond question that when the sitting bird is driven from the nest the egg is not infrequently carried along, being held close to the abdomen by the feet, and immediately on alighting on a limb incubation is resumed without any nest. On this point Mr. O. C. Poling, writing to Major Bendire, says: "In regard to their carrying the eggs about I have, in addition to the cases noted, shot two other females having the egg embedded in the feathers of the belly, and, further, held by the legs while flying. This accounts for the shooting of Pigeons having a broken egg smeared over the feathers, as I have done when no nest was to be seen." In the Cape region of Lower California there is a well-marked subspecies known as Viosca's Pigeon (*C. f. vioscæ*), which is much paler in color and generally lacks the tail-band. Its note appears to differ also, being, says Mr. Frazar, "more like the *hoo* of an Owl than the *coo* of a Dove. It is given twice, and is low and deep in tone."

The **Red-billed Pigeon** (*C. flavirostris*) of Mexico and Central America extends north as a summer visitor to southern Texas and Lower California. It is smaller than the last and has the tail of uniform shade throughout, with the head, neck, and breast purplish chocolate, but without metallic gloss. They frequent especially the trees along streams and build a much more substantial nest than is usual among Pigeons. This is generally placed in the middle of vines or well up in trees and next the trunk and is composed of sticks and quite carefully lined with fine stems and grasses. A single egg constitutes the set. The Tres Marias Pigeon (*C. flavirostris madrensis*) is a subspecies confined to the Tres Marias Islands, western Mexico. It is of larger size, with a longer and

larger bill and generally paler colors. It frequents the wooded sides of cañons, usually some distance back from the coast, where it keeps much to the higher branches.

White-crowned Pigeon. — The remaining form entering the United States is the White-crowned Pigeon (*C. leucocephala*), which reaches the Florida Keys but is mainly distributed over the Greater Antilles, Bahamas, and the coast of Central America. It is between twelve and fourteen inches in length and may be known by having the general plumage lead color with the entire top of the head white or pale grayish buffy, while the hind neck has a "cape" of metallic bronzy green or purplish, each feather bordered with velvety black. It is a shy bird, frequenting the smaller Keys, where it feeds on berries and fruits, and builds its nest in communities, often of large size, placing them on the mangroves or the prickly pears. The nests are fairly well made and the eggs apparently always two in number; several broods are reared each season.

Other Species. — Of the fifteen or more forms of this genus found in the West Indies and Central and South America, we shall have space to mention but few. Thus the Scaled Pigeon (*C. squamosa*), found in the Greater and Lesser Antilles, is about sixteen inches long and has a "cape" on the hind neck of metallic violet, with the head, neck, and crop region a rich vinous and the remainder of the plumage dark plumbeous. It is abundant in Porto Rico, and the late Mr. Wells reports it as the finest game bird found on Grenada, its flesh being considered a great delicacy. It is there strictly arboreal, mainly frequenting the highest mountain ridges, but resorting to the seacoast and islets about the month of April, for purposes of rearing its young. The nest is often placed in a tuft of grass and also on the outspreading branches of the mangrove and seaside grape, and is made of a few sticks and shaped by the body of the bird. Other Antillean species are the Ring-tailed Pigeon (*C. caribæa*) of Jamaica and the Blue Pigeon (*C. inornata*) of wider range. The Picazura Pigeon (*C. picazuro*), which ranges from Brazil to Paraguay and Argentina, is pale brown, the head and neck as well as the lower parts vinous, the hind neck banded with white. Mr. Hudson speaks of the Picazura as a common summer bird in Argentina, frequenting the woods in pairs or small parties, but in winter congregating in large flocks and roaming much over the open country. It is a wary bird, and when feeding walks over the ground in a slow and stately manner. Its notes are described as five in number, "the last one with a falling inflection, and profoundly sorrowful." Another species ranging from Peru and Bolivia through western Argentina and Patagonia is the Spot-wing Pigeon (*C. maculosa*), which may be known by the profuse apical spots of white on the back and wings. They are extremely active birds, visiting the grain fields in immense flocks and often doing much damage to the sprouting wheat.

Rock Dove. — Of the Old World species one of the most important is the Blue Rock Pigeon, or Rock Dove (*C. livia*), the wild form of the domestic Pigeon, which ranges from Europe through the Mediterranean countries to central Asia and China. About eleven inches long, the general plumage is gray, with the lower back white and the neck metallic green changing into purple on the lower

part, while the wings are crossed by two black bars, and the tail by a single broad terminal band. In the British Islands the Rock Dove is found along the rock-bound coasts of Scotland, Ireland, and the south and east coasts of England, and but rarely in any inland locality, although in Spain, Italy, and other parts of continental Europe it is an inhabitant of mountainous districts. It nests in caverns and fissures in rocks, placing the nest on a ledge, and "in its language, flight, and habits it is indistinguishable from the bird familiar to every one in a domestic state."

FIG. 141. — Rock Dove, *Columba livia.*

The **Indian Blue Rock** (*C. intermedia*) differs from the last mainly in having the lower back gray. It is very abundant, frequenting cultivated country and feeding on grain and seeds and nesting among rocks, old buildings, walls, and, when unmolested, human habitations generally. They are regarded as almost sacred and are protected by the natives of India, both Hindus and Mohammedans. There are several other closely related species, as *C. gymnocyclus* in Senegal, *C. schimperi* in Egypt and Palestine, and *C. rupestris* — the Blue Hill Pigeon — in central Asia, while not far removed is the Stock Pigeon, or Stock Dove (*C. œnas*). The latter is smaller than the Blue Rock, which it otherwise so much resembles in flight and coloration as to be often mistaken for it. It may be known by the plumage being bluish throughout. It ranges over Europe and central Asia, being, for instance, not uncommon in many parts of the British Islands. It is partial to woods, but is found in various situations, and builds its nest in a great variety of places, such as a hollow tree, pollarded tops of trees, ledges on cliffs, where it associates with the Rock Pigeons, and finally in rabbit burrows or under dense bushes. The nest is always slight and the eggs two in number. There is also an eastern representative of this species called the Eastern Stock Pigeon (*C. eversmanni*), which spends the summer in central Asia and western Siberia and the winter in India. It is smaller but does not otherwise differ greatly.

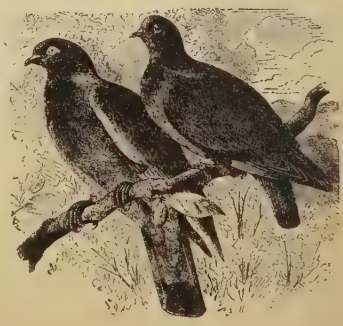


FIG. 142. — Ring Dove, *Columba palumbus.*

Ring Dove. — Very much larger and belonging to quite a different section of the genus is the Wood Pigeon, or Ring Dove (*C. palumbus*), of Europe, extending as far east as northern Persia. The length is fully seventeen inches and the plumage gray above and dull reddish purple or vinaceous below, with the head bluish gray, the sides and back of the neck glossed with violet and green, except for a small patch of white; the wings are also provided with white in the form of a broad band. This species frequents cultivated and inhabited

districts, even including towns, where it feeds on grain and seeds as well as berries and small fruits of various kinds, often doing much damage. The nest is a slight platform of sticks usually placed well up in a tree, and two or sometimes three broods are raised in a year.

Of the two remaining genera of this group, the first (*Nesænas*) has the first primary about equal to the sixth, and the tail of a uniform rufous color. The single species (*N. mayeri*) is confined to the Mauritius and has the plumage mainly pink with the wings and upper back brown; it is nearly sixteen inches long. According to Rothschild it is now much reduced in numbers and threatened with extinction. The final genus (*Turturœna*) comprises six African species. They are birds of moderate size, with the hind neck made conspicuous by means of very bright metallic colors, the sexes being often very unlike in coloration.

Long-tailed Pigeons. — The second group, known collectively as the Long-tailed Pigeons, has the tail longer than the wings, but the individual feathers are not sharp pointed at the tips, as in the next group. They are comprised in four genera and about forty species, all of the Indian and Australian regions. In the first genus (*Turacœna*) the general color of the plumage is slate, while the tail is only moderately graduated, the outer feathers being considerably more than half the length of the central ones. Of the two species, *T. menadensis* of the Celebes has the face and throat white, while the other (*T. modesta*) from Timor is plain slate-color throughout. Both, however, have the hind head, nape, and mantle with more or less of metallic golden green and lilac. The majority of the forms are embraced in the typical genus *Macropygia*, in which the head is small and Dove-like, the bill rather slender, and the plumage partly or wholly chestnut, purplish brown, or cinnamon, while the tail is strongly graduated. They are usually known as the Cuckoo-Doves, from the resemblance of their tails to those of the Cuckoos. Major Wardlaw Ramsey says of the general habits of these birds that they are Ground Doves "of a tame nature, very partial to open glades and clearings in dense forests, especially when covered with a secondary growth of low, scrubby jungle. It is generally found singly or in pairs, and on being flushed it only flies a short distance and alights on some convenient branch, spreading out the tail like a fan as it does so. Its food is composed of seeds and berries, of which it consumes an enormous quantity." Of the three species found in India, the Bar-tailed Cuckoo-Pigeon (*M. tusalia*) is about sixteen inches long and has much of the upper part black barred with rufous-chestnut and with parts of the head and neck lilac-gray overlaid with a changeable metallic gloss. On the Andaman and Nicobar Islands is found the Andaman Cuckoo-Pigeon, a bird the same size as the last, but with the upper parts dark brown somewhat speckled and barred with black, while the head is chestnut all around. Much smaller is the little Malay Cuckoo-Pigeon (*M. ruficeps*), which is widely spread over the Malay Peninsula, Burma, and Java to Borneo. It is said to be a shy bird, keeping to the dense forests in small parties of five or six. The only Australian species is the so-called Pheasant-Pigeon (*M. phasianella*) of East and South Australia, where it is a denizen of the dense coastal

scrubs. It is a handsome, graceful bird, about seventeen inches in length, chestnut-brown above and cinnamon-rufous below, with orange and purplish reflections on the back of the head and neck. It is an exceedingly tame bird, often seen in small parties on the road picking up seeds, or perched on low branches by the wayside. It is especially fond of the berries of the ink-weed (*Phytolacca*), and even when shot at returns in a short time to the same spot. Although a common bird, its nest has been but rarely found, and it may possibly prefer the seclusion of the dense forests. Such nests as have been discovered were usually placed in the dense top of a tree-fern and were quite large and well-made affairs. The eggs, one or two in number, are glossy white and brittle-shelled. In the two remaining genera of this group the bill is very thick and almost hooked at the tip, while the tail is much graduated. In *Reinwardtœnas*, of which five species are now known ranging from the Celebes to New Guinea, the head is not crested, while in *Coryphœnas* with its single species from the Solomon Islands, there is a prominent occipital crest. But little is known of the habits of any of these.

Passenger Pigeon. — The final group (*Ectopistinæ*) of the subfamily is represented by a single genus and species, the well-known Wild or Passenger Pigeon (*Ectopistes migratorius*) of eastern North America, though occasionally ranging west to the Pacific. It is a large, handsome bird, sixteen or seventeen inches long, with a graduated tail nearly as long as the wing, the feathers of which are narrow and pointed at the tips, thus differing from the members of the last group. The male is a rich bluish slate-color above and deep vinaceous below, passing into vinaceous pinkish on the sides and pure white on the lower abdomen and the under side of the tail, while the nape and side of the neck are glossed with a changeable metallic reddish purple, and the back and shoulders are washed with reddish brown and spotted with black. The female is similar but with the head more brownish gray, the under part grayish, and the neck less iridescent.

The Passenger Pigeon presents one of the marvels of bird life. A century ago, when the country was new and less settled, this bird, so wonderful for its gregarious habits, existed in flocks of such gigantic proportions that the numbers appear absolutely incredible. Thus Wilson, one of America's pioneer ornithologists, writing about 1808, estimated that a flock observed by him near Frankfort, Kentucky, contained not less than 2,230,272,000 birds, and Audubon five years later saw them at Henderson in the same state passing for three successive days in a practically continuous flock; "the air was literally filled with Pigeons, the light of noonday was obscured as by an eclipse," and the rush of wings was "with a noise like thunder." The general roosting places of these vast hordes were usually located in the tallest and densest forests and presented a curious and interesting spectacle. As they are birds of very powerful flight, they apparently often ranged several hundred miles away during the day, but as the sun began to decline they departed in a body for the roost. "Nothing," says Nuttall, "can exceed the waste and desolation of the nocturnal resorts; the vegetation becomes buried by their excrement to the depth of several inches.

The tall trees for thousands of acres are completely killed, and the ground completely strewed with massive branches torn down by the clustering weight of the birds which have rested upon them. The whole region for several years presents a continued scene of devastation, as if swept by the resistless blast of a whirlwind." Such a roosting place once existed on the borders of Lake Champlain in New York, and the forest to a great extent presented a scene of total ruin. Their nesting places were even more wonderful since they were necessarily of greater extent. One described by Wilson near Shelbyville, Kentucky, was several miles in breadth and extended through the woods for upward of forty miles. Every tree of suitable size was loaded down with nests, a large hemlock, for example, often holding from twenty to forty. The last nesting place in western New York occurred in 1868, near Olean, and extended for fourteen miles, while in Michigan the largest in recent years occurred in 1876 or 1877, and was twenty-eight miles long and some three or four miles in width. The last nesting place of any importance was also in Michigan in 1881, which Mr. Brewster says "was of only moderate size — perhaps eight miles long."

With the advent of the white man in this country, and the blessing of civilization, the war upon the Pigeon has been unceasing! Whenever a roosting or nesting place was discovered it was resorted to by a small army of despoilers, and with guns, poles, clubs, sulphur pots, and nets the work of destruction proceeded. Frequently from fifty to one hundred dozen were taken at a single throw of the net. At the large Michigan nesting it was estimated that five hundred netters were at work and their average catch was 20,000 birds apiece, while for another resort it was estimated that hardly less than 1,000,000,000, including those dead and wounded but not secured, and the myriads of squabs left dead in the nest, were "sacrificed to Mammon" during a single year. The result is what might be expected, — the Wild Pigeon is now a very rare bird, perhaps quite on the verge of extermination. They apparently no longer breed in colonies, but the comparatively few remaining break up into couples and resort to isolated or scattered localities.

The nests were slight platforms of sticks very insecurely placed and the eggs one or two in number. Both birds assisted in incubation, "the females between two o'clock P.M. and nine or ten o'clock the next morning; the males from nine or ten o'clock A.M. to two o'clock P.M. The change was made with great regularity as to time, all the males being on the nest by ten o'clock A.M." Their food consisted principally of oak and beech mast, but also grain, nuts, seeds, and occasional insects. They never fed near the "nesting," leaving that for the young, but often went a hundred miles or more away. The manner of a large flock while feeding is graphically described by Dr. J. M. Wheaton, who observed it in Licking County, Ohio, in 1859: "The flock, after a little circling by the foremost ranks, alighted upon the ground, presenting a front of over a quarter of a mile, with a depth of nearly a hundred yards. In a very few moments those in the rear, finding the ground already stripped of mast, arose above the tree-tops and alighted in front of the advance column. This movement soon became continuous and uniform, birds from the rear flying to the front so rapidly

that the whole presented the appearance of a rolling cylinder having a diameter of about fifty yards, its interior filled with flying leaves and grass. The noise was deafening and the sight confusing to the mind."

The Ground Pigeons. — While the members of the preceding groups spend the main portion of their lives in trees, those of the present group are so confined to a terrestrial life that they are appropriately denominated Ground Pigeons. Structurally they are distinguished by having the tarsus equal to or even longer than the middle toe, while the number of tail-feathers varies from twelve to twenty. They constitute a large, widely distributed group of over forty genera and about two hundred species which, according to Salvadori, may be disposed among seven more or less well marked minor groups.

Mourning Doves. — The first of these minor groups (*Zenaidinæ*), embracing four genera and about sixteen forms, comprises the Mourning Doves, so called from their peculiarly sad and mournful notes. They are all natives of the New World, being most abundant in Central and South America. Collectively they are distinguished from the other groups by the presence of a blackish more or less metallic spot beneath the ear-coverts. In the typical genus (*Zenaidura*) the tail of fourteen feathers is long and graduated, the upper parts plain brownish with the scapulars and wing-coverts black-spotted, while the lower parts are purplish vinaceous or cinnamon.

The best-known species is the true Mourning Dove (*Z. macroura*), which is spread over the whole of temperate North America, from Canada and British Columbia south to Panama and the West Indies. It is from eleven to thirteen inches long, the male being olive grayish brown above, the crown bluish gray with a glaucous "bloom," while the sides of the neck are glossed with changeable metallic purple, and the under parts are vinaceous, becoming creamy buff on the lower abdomen and under tail-coverts. The female is slightly smaller, generally paler, and is not purplish below.

The Mourning Dove, although not a rare bird in the Eastern States, is perhaps most frequently observed in pairs, whereas in the more arid portions of the West it is usually found in parties of from a dozen to fifty or more, and in the northwestern portion of New Mexico I have observed them in flocks of several hundred. They are tame, gentle birds when not much molested, frequently breeding in gardens and shrubbery near dwellings, and often feeding with domestic poultry. The mating season begins early in March in the southern portions of their range, but later northward, where they are regularly migratory. Their peculiar love notes, well known to most observers, are frequently heard in spring and occasionally at other seasons. While difficult to describe, they may be fairly represented by the syllables "*coo, coo, coo,*" with a rising inflection, and ending in a low, mournful "*ooo, ooo, ooo,*" with a falling inflection. It is nevertheless a far penetrating note and may be heard for a distance of half a mile or more. The nest is placed in a great variety of situations, sometimes on the ground or a bare rock without the presence of even a few straws, but usually it is a frail platform of twigs placed on bushes, stumps, or low trees, and not infrequently they take

possession of the abandoned nests of other birds, either adding a few sticks or using them as they are found. The eggs, according to Bendire, usually two in number, may sometimes be only one, and occasionally three or four, although it is probable that when of the latter number more than one bird may have occupied the nest. Two or three broods are raised in a season, the young being fed at first on cutworms and bugs of various kinds and later on seeds and grain. They grow rapidly and are soon able to care for themselves, although it is not an uncommon sight to see a female covering fully fledged young. The mature birds feed on small seed, grain, berries, small acorns, and beechnuts, and in certain parts of their range they do considerable damage to sprouting corn and early peas. They are often seen in weed and stubble fields or along roads, where they are fond of taking dust baths. Although sometimes found during the day at a distance from water, they regularly resort at morning and evening to their drinking places, and by following the direction of their flight the thirsty traveler has more than once been led to a spring or other water supply.

The three other forms of the genus are found respectively in Yucatan, and on Clarion and Socorro islands.

Zenaida Doves.—Differing from the Mourning Doves in having a shorter and rounder tail of only twelve rectrices are the Zenaida Doves (*Zenaida*), of which some nine forms are recognized. They are olive-brown or russet above, with the scapulars black-spotted and the head, neck, and breast cinnamon-color, which is relieved by a spot of blue-black beneath the ear, and reflections of changeable metallic purple on the sides of the neck.

The handsome little Zenaida Dove (*Z. zenaida*) is the only species found in the United States, ranging from the Florida Keys through the Bahamas, Greater and Lesser Antilles to the coast of Yucatan. It is, however, now rare on the Florida Keys. It is about ten or ten and a half inches long, and the sexes are similar. It is rather solitary, never being met with in flocks, and spending most of its time on the ground, where it builds its nest or sometimes in holes in rocks or on very low trees and bushes. Scott found them breeding in Jamaica among low woods and mangroves. Closely allied is the Antillean or Seaside Dove (*Z. castanea*), which differs in having the under tail-coverts whitish instead of deep cinnamon; it is found in the Lesser Antilles. In Grenada, Wells speaks of it as very numerous all around the island, frequenting the mangroves, open pastures, the cliffs overhanging the sea, and the little islets. It feeds on fallen berries and seeds, pigeon peas, etc., and makes its nest generally in a tuft of grass, sometimes on the bare ground or on ledges along the cliffs. The other species do not differ very greatly in plumage and have similar habits.

The Galapagos Archipelago is the exclusive home of a Ground Dove (*Nesopelia galapagoensis*), eight and a half inches long, which is similar to the members of the last genus but with the tail proportionally shorter and less graduated, while the legs and feet are larger and stouter, and the bill longer and stouter; but little is known of its habits.

White-winged Dove.—The final genus of this group (*Melopelia*) embraces but two species, the best-known being the White-winged Dove (*M. leucoptera*)

of the southern United States, Mexico, the Greater Antilles, and Central America. In this genus there are no black spots on the shoulders, but there is a large white patch covering the larger wing-coverts, whence their vernacular name; the tail consists, as in the last, of twelve feathers. Within the United States the White-winged Dove is nearly confined to the southwestern border, where in suitable locations it is fairly abundant. It prefers the rough foot-hills, keeping much to the shrubbery along watercourses and feeding on insects, seeds, berries, grain, cactus fruits, etc. The mating season begins early, usually about the middle of March, and apparently only one brood is reared in a season, although in the West Indies eggs may be found from February to July. The nests are placed in trees or occasionally in low bushes. "Their call notes," says Bendire, "are varied, much more so than those of any other species of this family found with us; they are sonorous, pleasing, and rather musical. On this account the natives keep them as cage birds, calling them Singing Doves. One of their most characteristic call notes bears a close resemblance to the first effort of a young cockerel when attempting to crow, and this call is frequently uttered and in various keys; while thus engaged the performer usually throws his wings upward and forward above the head and also spreads his tail slightly. Some other notes may be translated into '*cook for you*' or '*cook for two*,' '*cook-kara-coo*,' besides a variety of calls." In Jamaica, Scott speaks of them as being strictly gregarious, moving and feeding in flocks, and feeding especially on the seeds of the moringa or horseradish tree. Here they nest in clumps of cactus and thorny trees and in mangroves along the coast. The eggs vary from dull white to reddish white. In Peru and northern Chile its place is taken by a closely allied species (*M. meloda*), which is characterized by larger size, a stronger bill, and narrower light tips to the lateral tail-feathers.

The Turtle Doves. — The remaining members of this subfamily are without the blackish spot beneath the ear-coverts which marked the first group. Of these we may first mention the Turtle Doves (*Turturinæ*), which are comprised in six genera and about thirty-five species, all natives of the Old World. By some these genera are regarded as simply subgenera of the typical genus *Turtur*, but as they are fairly well distinguished it seems best to keep them distinct. Collectively they are known by the absence of metallic spots on the wings, rather broad tails of twelve feathers, and either a more or less distinct dark collar, or rather scale-like patches on the sides of the neck. In the first four genera (*Turtur*, *Homopelia*, *Œnopopelia*, and *Streptopelia*) the feathers of the neck are normal, that is, not bifurcate at the ends, while in *Spilopelia* the feathers of the hind neck are thus split, and in the *Stigmatopelia* it is the feathers of the fore neck that are bifurcated.

Turtle Doves. — In the typical genus (*Turtur*) as now restricted there are six species, of which the true Turtle Dove (*T. turtur*) is perhaps the best known. This bird, which is about eleven and a half inches long, is found throughout Europe, retiring in winter to northern and northeastern Africa. The head and nape are ash tinged with wine-red, the neck and breast pale wine-red, the back ash-brown, and the abdomen and under tail-coverts white; there is a small

space on the sides of the neck composed of black feathers tipped with white, while the primaries are dusky, the secondaries bluish ash, and the shoulders and wing-coverts rust-red, each feather with a black spot near the center. The sexes are similar, although the plumage in the female is a little less bright and pure. In England, where it is a not uncommon bird, it is described by Mr. Hudson as inhabiting woods and plantations, and as being of a rather shy disposition is not often noticed. "In autumn," he says, "it may be seen in small companies, usually composed of a pair of old birds and their young; at other times it goes alone with its mate." Its spring song is described as a soft, agreeable, rather plaintive cooing note. The nest, the usual slight structure, is placed in a low tree or hedge, and the creamy white eggs are two in number; two broods are usually reared in a season and in September it departs for its African winter home.

Of the other species we may mention the Rufous Turtle Dove (*T. orientalis*), a resident species ranging from the eastern Himalayas throughout Assam and Burma to northern Tenasserim, Korea, and Japan, and the Indian Turtle Dove (*T. ferrago*), a migratory bird ranging from southwestern Siberia to central Asia, India, and Ceylon. The latter breeds in the Himalayas at elevations of from 4000 to 8000 feet, placing the frail nest in a tree.

In the genus *Homopelia*, which is confined to Madagascar and the neighboring islands, there are seven living, and a single fossil, species, the latter from the Pleistocene of Rodriguez. They are distinguished from the true Turtle Doves by having the upper wing-coverts uniform or not mottled. As the habits of these birds are not well known, we may pass to the next genus (*Streptopelia*), which is distinguished at once by the presence of a complete black collar on the hind neck. The fourteen species now recognized are widely dispersed over Africa, southeastern Europe, central Asia, and the Oriental region. The tame Turtle Dove (*S. risoria*) belongs here, but the species from which it has been derived is uncertain, according to Salvadori. To convey some idea of the various species we may mention first the Damara Dove (*S. damarensis*) of Southwest and East Africa. About ten inches in length, it is mostly pale leaden gray, becoming pale vinous gray on the sides of the head, neck, and chest. It is the most abundant Dove in Damara Land and adjacent regions, feeding on the ground on seeds and berries, and although not strictly gregarious, numbers are often found in close proximity. The nest is built on a small tree, generally at the extremity of a bough. Another species is the Indian Ring Dove (*S. douraca*), a large bird some twelve and a half inches long, which is found from Turkey in Europe through Persia, the Indian peninsula, and Burma to China and Japan. The head, neck, and breast are pale pink or vinous, becoming white on the chin; the black collar is narrowly bordered above and below with white, while the back and the middle tail-feathers are a light brown, becoming ashy gray on the coverts and secondaries. This is a common bird in many parts of India, frequenting hedges and trees about cultivated tracts as well as bush or reed jungles. It has a deep, trisyllabic call note, and breeds the year around, placing the nest in bushes or trees not far from the ground.

Very closely allied to the last is *Œnopopelia*, a genus of two species which differ in the much longer wing and the more marked dissimilarity between the sexes. Perhaps the best-known is the Red Turtle Dove (*O. humilis*) of the Indo-Chinese countries, Japan, and the Philippines, a bird about nine inches long, in which the plumage is vinous red, marked on head, back, rump, and flanks with gray, paler on the forehead, while there is a black collar on the hind neck and the wings, and their coverts are blackish. The female is pale brown, grayer than the male, and the collar is paler edged. The remaining species, known as the Tranquebar Dove (*O. tranquebarica*), is found in the Indian peninsula and differs in the much lighter, almost ashy white, color of the under wing-coverts. The former is a not uncommon bird in many parts of India, exclusive of the forest tracts, and is found often in small flocks near cultivated areas. It is described as wild and difficult to approach, and as having a short, deep call note.

Spotted Doves. — The three species of the genus *Spilopelia*, known collectively as the Spotted Doves, are distinguished at once by having the feathers of the hind neck forked at the ends, black in color, and each marked with two white apical spots. Of these the Chinese Spotted Dove (*S. chinensis*) of China and Formosa is about thirteen inches long, pale brown above and rich vinous below, lighter on the chin and abdomen, and gray on the head, sides, and under wing-coverts, while the nape is black with white spots, and the two central tail-feathers are brown, and the others black, tipped with gray or white. In the Malayan Spotted Dove (*S. tigrina*) of the Burmo-Malayan countries and the Celebes, the under tail-coverts are white instead of gray, and the wing-coverts are marked with brown shaft-lines. In the last species (*S. suratensis*) the under tail-coverts are marked with two reddish spots on the sides of the tip. It is a native of the Indian peninsula and Ceylon, frequenting the well-wooded districts, and often coming into gardens about houses. It breeds almost throughout the year, though in northern India the principal season for laying eggs is from October to May. It has a plaintive call of three syllables. The habits of the others are similar.

In the final genus (*Stigmatopelia*), which also embraces three species, the curiously forked feathers are confined to the front neck and are marked at the tip with two rufous spots. Of these the Senegal Turtle Dove (*S. senegalensis*) is a handsome bird about eleven inches long, with the upper parts, including the head, neck, and breast rich vinous, becoming white on the abdomen and bluish lead-color on the rump. It is a very widely distributed species, ranging over the whole of Africa and extending thence into Palestine. The second species, known as the Little Brown Turtle Dove (*S. cambayensis*) is also widely spread from southeastern Europe through central Asia to the Indian peninsula. It is similar to the last, but has the upper parts earthy brown and the rump uniform in color with the back. It is a very common bird throughout almost the whole of peninsular India, occurring about houses and in the dense bush jungles as well. It breeds throughout the year, placing the nest in shrubs, low trees, buildings, or on the ground.

Australian Doves. — In the next group (*Geopeliinæ*), which includes three genera and some nine forms and is found in both Old and New Worlds, the members agree with the last in the absence of metallic spots on the wings, but

differ in a longer tail and the absence of a metallic luster from any part of the body. They are all small birds, hardly exceeding eight and a half inches in length. The typical genus (*Geopelia*) is found in the Old World and is characterized by a tail of fourteen feathers and the first primary with a narrowed tip. Of the five known species three are found in Australia, perhaps the best-known being the so-called Ground Dove, the Peaceful or Placid Dove of Gould (*G. tranquilla*). In color it is gray on forehead, cheeks, and throat, ashy brown on back and wings, each feather with a band of velvety black at the tip, and pale vinous on breast and sides, passing into white on the abdomen and under tail-coverts, while the neck is marked with numerous narrow black and white bands. It is a common bird, frequenting especially moist meadows and grassy stream banks, often in flocks of twenty to fifty, and feeding on seeds and berries. The nest is a very slight structure, only two or three inches in diameter, composed of twigs and rootlets and usually placed on a horizontal limb, often overhanging water. Its small size renders it difficult to discover among the branches, and they are not very frequently taken; the eggs are two in number. The other Australian species are the Banded-shouldered Dove (*G. humeralis*) and the Little or Turtle Dove (*G. cuneata*), the latter being but seven and a half inches long, and the smallest representative of the group in Australia. They are very tame, gentle little birds, chiefly of the interior, frequenting the vicinity of habitations and often kept as cage birds. The nest is much like that just described, but is even more frail. The other species of the genus are widely distributed over Oriental regions.

Inca and Scaled Doves. — Of the New World representatives the genus *Scardafella* includes three forms which are grayish brown above, each feather with a border or crescentic bar of dusky, and pale grayish vinaceous below, passing into white or buff posteriorly, and a tail of only twelve feathers. Of these the Inca Dove (*S. inca*) is found from the southwestern border of the United States through Mexico to Guatemala, being for example tolerably common during the warmer portions of the year at several points in Texas and Arizona. Scott says, "The birds are very tame and seem to affect particularly the streets, corrals, and gardens in the heart of the town." The nest, a fairly well made structure, is placed in a fruit tree, mesquite shrub, or other low bush. Its near relative, the Scaled Dove (*S. squamosa*), is found from Brazil to Venezuela and Colombia, and may be known by the white patch on the wing-coverts and secondaries, a white abdomen, and very heavy cross-bars of black. The remaining form (*S. ridgwayi*) is found only on Margarita Island, Venezuela. The final representative of the group (*Gymnopelia erythrothorax*) is confined to the mountains of Peru, Bolivia, and northern Chile.

Exclusively American, the members of the fourth group (*Peristerinæ*) are comprised in six genera and some twenty forms, all being birds of small size with metallic spots on the wings and plain-colored plumage. They have short wings, the primaries being but little longer than the secondaries, and twelve feathers in the tail. As they are quite uniform in habits and appearance, it is only necessary to mention a few, among them, of course, the Picui Dove (*Columbula picui*),

the *Tortolita* (Little Turtle Dove) of the South Americans. It is only six and a half inches long, brownish cinereous above, pale vinaceous below, and white on the abdomen and tail, with a bright blue band across the tips of the lesser wing-coverts; its range is from Brazil and Paraguay to Argentina and Chile. Mr. Hudson speaks of it as a familiar, tame species in the Plata district, coming much about houses in pairs or small flocks, and being especially lively in its habits. He says: "It sings a great deal in summer, and even on warm days in winter; but its tones are wanting in the wild pathos which gives a charm to the melody of some of our larger species, the song consisting of a succession of long, rather loud and somewhat monotonous notes, pleasant to hear, like most bird-music, but nothing more."

Ground Doves. — The largest genus of the group is *Chæmepelia*, which embraces about a dozen species and subspecies, two of which reach the United States. Collectively, they are grayish brown or chestnut above and chiefly vinaceous below, with separate metallic spots on the upper wing-coverts, and rounded tails which are shorter than the wings. The Ground Dove (*C. passerina*) is found in Jamaica, while several more or less well marked subspecies are found in various regions. Thus one subspecies (*C. p. terrestris*) is the Ground Dove of the South Atlantic and Gulf States, and another the Mexican Ground Dove (*C. p. pallescens*) of Mexico, Central America, and the southwestern border of the United States. The South Atlantic bird breeds abundantly throughout the southern part of its range, and is a very interesting and confiding little bird, frequenting fields and the vicinity of houses and building its nest in orchards and in bushes and vines about habitations or rarely on the ground. It builds a rather substantial nest of twigs, weeds, and moss, and shows much concern in the care of its home. "When one is driven from a nest containing eggs, it will drop to the ground as if shot, and will then flutter around as if wounded, to try to draw the person disturbing it away from the nest, but, whether it succeeds or not, it will soon fly off." — RALPH. Its mournful notes are not unlike those of the Mourning Dove, although Chapman speaks of its "mellow, crooning *coos* uttered so softly that they float on the air as though born of murmuring winds."

The Mexican Ground Dove, which differs in its paler coloration, longer wings, and smaller bill, is a similarly confiding bird, coming to the vicinity of human industry and picking up grain and crumbs thrown to it. The remaining species are mostly Central or South American.

The only other member of the group that we may mention is the Black-winged Dove (*Metriopelia melanoptera*) of western South America from Ecuador to Chile. It is about eight inches long, pale brown above and pale vinaceous below, with black wings and tail, relieved with a white band at the bend of the wing. It frequents the high valleys of the Cordilleras at an altitude of from 6000 to 12,000 feet and may always be seen in numbers by the traveler over the passes of the Andes.

Returning again to the Old World, we find, especially in Africa and Australia, the members of the fifth group (*Phabinæ*), disposed among a dozen genera and some twenty-five forms. They are birds of large or moderate size, with metallic

blue or green spots or patches on the wings and often somewhat mixed coloration of plumage.

Green Pigeon. — Coming now to Australia, we may mention a few of the more important or interesting members of this group, among them the beautiful little Green Pigeon (*Chalcophaps chrysochlora*), a bird about nine and a half inches in length, with a head, neck, upper back, breast, and abdomen vinous, and the middle of the back, scapulars, and upper wing-coverts resplendent golden green, the wings ornamented by a small, snow-white patch on each shoulder. It frequents the low scrubs and is almost wholly terrestrial in its habits, feeding on fallen seeds and fruits. Although not uncommon in suitable locations, its nest has but recently been discovered, being an especially frail structure placed in a low tree. Other species of the genus, to the number of five or six, are widely spread over the Oriental region.

Bronze-winged Pigeons. — Exclusively Australian and Tasmanian are the two species of Bronze-winged Pigeons (*Phaps*), both about thirteen inches long. In the common Bronze-wing (*P. chalcoptera*) the plumage above is largely fulvous or brownish gray, the throat white and the breast vinous, while the wing-coverts are provided with a broad spot of rich coppery red or golden bronze-green. This bird is widely distributed and is perhaps the best known of its tribe in Australia, frequenting the low groves or the little meadows and plains among the scrubs, through which it flies with astonishing swiftness. At evening, rarely in the morning, it repairs to its drinking place, often coming from great distances and in large flocks. It feeds entirely on the ground on seeds, grain, and fallen fruit. The nest is usually placed on a horizontal limb of a low tree, sometimes on a stump or even on the ground. The Brush Bronze-winged Pigeon (*P. elegans*), as its name indicates, prefers the more scrubby situations, especially in swampy places, and is more shy and solitary than its relative. It is slightly smaller than the other and has the throat chestnut instead of white.

Flock Pigeon. — Another Bronze-wing, more widely known as the Flock Pigeon (*Histriophaps histrionica*), is the sole representative of its genus. It is about eleven inches long, cinnamon-brown above and bluish gray below, with head, throat, and ear-coverts jet-black, except on the forehead, a circle around the ear-coverts and the gorget, which are snow-white, while the secondaries are marked with a patch of metallic purple. This bird, it is said, never alights on trees, but spends its entire time on the ground, frequenting mainly open, grassy plains and feeding almost entirely on seeds. It associates in winter in flocks of vast size, — or rather once did, for they now seem sadly depleted in numbers, — which has earned for it the name of Flock Pigeon. These flocks, which often numbered hundreds of thousands of birds, seem to have rivaled in size those of the North American Passenger Pigeon, and like them to be going down before the advance of civilization. In seeking water, which they do mainly at evening, they come in large flocks, often from great distances, and after flying once or twice around the drinking place to assure themselves of its security, settle about the water in incredible numbers. This invariable habit has been taken advantage of for their destruc-

tion by man, both civilized and aboriginal, who conceal themselves near the pool and when a large number have settled pull a net over them, or slaughter them with guns. The black men, selecting the right moment, when the birds are most compactly gathered, hurl their boomerangs into the mass, often securing several dozen within the space of a minute of two. The Flock Pigeon nests in a slight depression on the bare ground, under a tuft of grass, and while not exactly in communities many may be found in proximity. The chief cause for their decrease in numbers is said to be the stocking of the plains with sheep and cattle, which trample the eggs and young, and eat the grass down until it is prevented from seeding.

Partridge-Pigeon. — Passing over the two so-called Rock Pigeons (*Petrophassa*), of which but little is known, we may mention the Partridge-Pigeon (*Geophaps scripta*), mainly of the interior part of eastern Australia. It is light brown above, with the throat and cheeks white, the lores and three bands on the side of the head black, while the lower parts are grayish white, becoming fawn-color on the abdomen; there is also a speculum on the greater wing-coverts of metallic greenish purple which is barred with darker, and the tail is reddish brown; the length of the bird is about twelve inches. This species is found in pairs or small flocks on the plains or open timbered country, and from its habit, when approached, of running away rapidly and crouching or "squatting" down motionless, it is often called the Squatter Pigeon. It is strictly terrestrial and makes its nest in a shallow depression on the ground and lines it with soft grass.

The two remaining genera of this group, also exclusively Australian, are distinguished at once from the other members by the possession of well-defined crests. In the first genus (*Lophophaps*), which includes three species known as Plumed Pigeons, the tail is relatively short and nearly even, while in the other (*Ocyphaps*), known as the Crested Pigeon, the tail is long and much rounded.

The **Plumed Pigeons** are handsome little birds about eight inches in length, the best-known species being the true Plumed Pigeon (*L. plumifera*) of northwestern Australia. The general plumage is pale cinnamon-color, the back of the neck and mantle with brown bars, while the upper wing-coverts and scapulars are beautifully rayed with cinnamon at the tip of the feathers, with brown in the middle and gray at the base; the primaries are cinnamon and the secondaries brown edged with rufous, and there is an oblong bronzy purple spot on the inner webs of three of the inner secondaries; the chest is very rich cinnamon bounded below by a crescentic band of white, succeeded by a narrow one of black, while the center of the abdomen is snow-white and the flanks cinnamon; the irides are bright orange, and the lores and bare skin around the eye crimson or orange-red, bounded above and below by a narrow line of black, and the long crest plumes are cinnamon, paling into whitish buff toward the tips. This elegant little bird frequents the heated and arid plains of the interior, where, says Captain Sturt, "it was generally perched on some rock fully exposed to the sun's rays and evidently taking a pleasure in basking in the tremendous heat. It never perched in trees, but was seen sunning in the grass on the creek side and could hardly be distinguished from a Quail. When it dropped after rising from the

ground it could seldom be flushed again, but ran with such speed through the grass as to elude our search." These birds breed at any season of the year, but apparently the principal season is from October to March. The nest is a mere depression in the ground under a tussock of grass, and the two eggs are of a creamy white. In western Australia the place is taken by the Red-plumed Pigeon (*L. ferruginea*), which differs in having the cinnamon-color of a deeper hue, and in South and Northwest Australia occurs the White-bellied Plumed Pigeon (*L. leucogaster*), which differs from the others mainly in being duller and paler. Their habits are similar.

The **Crested Pigeon** (*Ocyphaps lophotes*) is found throughout Australia in general, frequenting the plains and open timbered parts of the inland region. It is larger than those last mentioned, being twelve and a half inches long. The general plumage, including head, face, throat, breast, and abdomen, is gray, while the lengthened occipital plumes are black, and the back of the neck, back, rump, flanks, and upper and under tail coverts light olive-brown; the feathers covering the insertion of the wing are deep black, while the greater wing-coverts are shining bronzy green, margined with white, and the primaries brown, margined with white. Of its habits Gould says: "It frequently assembles in large flocks, and when it visits the lagoons or river sides for water, during the dry season, generally selects a single tree, or even a particular branch, on which to congregate before descending simultaneously to drink. Its flight is so rapid as to be unequaled by those of any member of the group to which it belongs, an impetus being acquired by a few quick flaps of the wings; it goes skimming off apparently without any further movement of the pinions. Upon alighting on a branch it elevates its tail and throws back its head, so as to bring them nearly together, at the same time erecting its crest and showing itself off to the utmost advantage." The nest is placed on a bush or low tree.

The sixth group of this subfamily (*Geotrygoninæ*) is a large one, embracing some ten genera and upward of ninety forms of robust or Partridge-like, essentially terrestrial birds with stout legs and short, very broad and much-rounded wings, the latter without metallic spots, though often with a broad glossy patch of violet near the bend. About equally distributed among the Old and New Worlds, the first genus to which attention may be directed (*Haplopelia*) is characterized by having the primaries very broad and not tapering to a point, while in all the others the primaries are more or less narrowed or pointed. The half dozen or more species comprising the genus *Haplopelia* are all African, perhaps the best-known being the South African Cinnamon Dove (*H. larvata*), the ground color of which is a dark brown above, becoming vinaceous on the back of the head and neck and iridescent with a beautiful coppery green, while the throat and top of the head are white and the under parts vinaceous, becoming rufous on the abdomen. This bird is the Lemon Dove (Limoen Duif) of the colonists and is not uncommon over many parts of South Africa, keeping almost entirely to the ground in the dense bush and darker parts of the forest, where its brown colors serve admirably to conceal it; it is rare to find more than two or three together. In seeking for its food, which consists mainly of berries,

it is silent and when disturbed flies for only short distances. The nest is the usual rude platform of sticks placed on the horizontal branches of a tree or in dense creepers near the ground. The other species of the genus are more locally distributed throughout the African continent and on the islands off the west coast.

Among the genera with attenuated primaries the genus *Leptoptila* is distinguished by having the tail more than half the length of the wing. It embraces about twenty-five forms and ranges from the Rio Grande Valley in southern Texas through Mexico and Central America to Peru and Argentina, the only United States form being the White-fronted Dove (*L. fulviventris brachyptera*), which is distributed from Guatemala and Mexico to Texas. This bird is about twelve inches long, olive-brownish above glossed with metallic reddish purple reflections on the sides and back of the neck, while the top of the head is bluish gray, the forehead creamy white, and the under parts pale vinaceous, becoming pure white on the chin, abdomen, and under tail-coverts. This species was first found within our limits near Hidalgo, Texas, by Mr. George B. Sennett, who remarks that it arrived from the south about the middle of February and returned in November. It is very retiring in its habits, frequenting the dense and heavy timber, and if it were not for its peculiar note — a short, soft *coo* — it would be seldom noticed. The nest, usually placed in a thorny shrub or low tree, is only a few feet from the ground and contains the usual two eggs. The only other species that we will take the space to mention is the so-called Solitary Pigeon (*L. chlorauchenia*) of southern Brazil and Argentina, which is grayish brown above, the feathers of the hind neck being edged with iridescent bronzy green and mostly white below; it is but ten inches in length. In Argentina, Hudson states, it inhabits the wood, especially of the Plata district, and never seeks the open country to feed. It is solitary, although where many birds live in close proximity three or four may sometimes be seen in company. It spends a great deal of time on the ground, where it walks about under the trees rather briskly, searching for seeds and berries. Where the birds are abundant the wood just before sunset becomes vocal with their curious, far-sounding notes.

Passing over the genus *Osculatia*, the two species of which are found in Ecuador, we come to the Quail-Doves (*Geotrygon*), of which there are some eighteen forms, all American, ranging from the Florida Keys through Mexico to Bolivia and Paraguay. They are mainly uniform chestnut above, with the back, and sometimes other portions, with more or less of a metallic gloss, while the lower parts are white or buffy, becoming brownish or vinaceous on the chest; the tail is short and composed of twelve feathers. The Key West Quail-Dove (*G. chrysia*) occurs on most of the Greater Antilles and the Bahamas, and was at one time quite abundant on the island of Key West and the extreme southern Florida Keys, but it is now apparently rare there. It is found in the densely timbered portions, where it may be seen scratching among the leaves for its food of fallen fruit. It is not uncommon in some parts of Cuba, though it is difficult to observe. The closely related Ruddy Quail-Dove (*G. montana*) is found throughout tropical America in general, and a single example has been taken at Key West, Florida.

With a single exception the remaining genera of the group are confined to the Old World. Of these *Phlogœnas* includes about thirty forms, some of which, however, are of doubtful authenticity; it is distinguished from the last mainly in possessing a tail of fourteen feathers. The species are separated into two well-marked groups, in the first of which there is a patch of feathers with long and stiff barbs on the middle line of the crop region; the second group is without this feature. As characteristic of the first we may select the so called Blood-breasted Dove (*P. luzonica*), a handsome bird of the Philippines, in which the forehead and crown are delicate gray, the top of the head, upper parts and sides of the breast dark gray, the feathers edged with metallic purple, while the cheeks, throat, and breast are white, the latter relieved by a large patch of blood red in the middle. The other species of the genus are spread over the Malay Archipelago and Polynesia. The only Australian representative of the group is the Wonga-Wonga Pigeon (*Leucosarcia picata*), a large bird nearly fifteen inches long, the sole member of its genus. It may be distinguished from the other members of the order in this region by its dappled gray plumage set off by pink feet and bill and dark brown eyes. It inclines to be stationary in its habits and frequents the eastern forests and scrub mainly from North Queensland to Victoria. "It loves to dwell in the everlasting shades of the scrub," says Campbell, "and seems always to be on the ground feeding upon fallen fruits and berries. Along some lonely and unfrequented track they may be flushed with loud flapping noise of wings, and they usually afford a good shot by flying along the track for a short distance before diverging into the scrub. Their loud call notes are readily distinguished from all other Pigeons', being a rapid, continuous, high-pitched '*hoo-hoo-hoo-hoo*,' which may be heard half a mile off." Their flesh is very white and delicate and is much esteemed for food, with the consequent result that so many have been killed for this purpose that they are becoming rare. The nest is an exceedingly frail structure of sticks and twigs placed in a tree, usually between ten and twenty feet from the ground, and the eggs, always two in number, are glossy, pure white.

New Guinea is the home of two genera, one of which, *Eutrygon*, is distinguished by having the tarsus twice the length of the middle toe, and the other — *Otidiphaps* — mainly by possessing a tail of twenty feathers. As but little is known of their habits, we may pass to the final genus (*Starnœnas*), which includes only the Blue-headed Quail-Dove (*S. cyanocephala*) of Cuba and the Florida Keys. Structurally it is distinguished from the other members of this group by having the front of the tarsus covered with small hexagonal scales, while the general plumage is plain olive-brown above and dull rusty beneath, with the top of the head dull cobalt-blue, bordered with black below; there is a broad white stripe from the chin to the back of the head, and the throat and breast are black, bordered below by a pure white line. Its length is some eleven or twelve inches. This bird is rather an accidental visitor to the Florida Keys and has not been known to nest there for many years. It is, however, not uncommon in certain parts of Cuba, where it is found in the extensive forests, and there, according to Dr. Gundlach, it may be seen moving slowly, with neck contracted and tail

erect, searching for food among the dead leaves on the ground. Its call notes, he says, are deceptive, appearing near when distant, and distant when close by, and its flight is noisy when starting, being similar to that of the European Partridge from which it has received the misleading name "Perdiz."

The final group of the subfamily (the *Calænadinæ*) is the smallest of all, comprising but a single genus and three species, all confined to the Malay Archipelago and the Pelew Islands. As already briefly indicated, they are distinguished at once by having the feathers of the neck very long and narrow, resembling the so-called hackles on the neck of a game-cock. The best-known species is the Nicobar Pigeon (*Calænas nicobarica*), a strikingly beautiful bird about fourteen inches in length, with the plumage a rich metallic green, showing coppery reflections, while the head, neck, and upper breast are nearly black and the upper and under tail-coverts and the curiously short tail itself are pure white. The bill and a rather prominent knob at its base are black, while the feet are dark purple and the sides of the feet and nails ochraceous yellow. The Nicobar Pigeon, which ranges from the Nicobars through the Mergui Archipelago and Greater Sunda Islands to the Moluccas, New Guinea, and the Bismarck Archipelago, seems rather to avoid large bodies of land and to be confined to small islands, on some of which it occurs in thousands. Much of their time is spent on the ground hunting among the dead leaves for their food, although in the Philippines, Peale found them frequenting the highest forest trees in company with the Nutmeg Pigeons. Their only note at this time is a hoarse croak. The nest, a rude affair of sticks, contains, it is said, but a single egg.

A smaller and somewhat doubtful species (*C. maculata*) with the feathers of the wing and scapulars tipped with a spot of pale cinereous white has been described, but its home is unknown. The Pelew Island Pigeon (*C. pelewensis*) is similar to the Nicobar Pigeon but smaller, being only eleven inches long, and has the plumage indigo-blue instead of metallic green.

The Crowned Pigeons (Subfamily *Gourinæ*). — Entirely confined to the Papuan and Solomon islands are the splendid Crowned Pigeons, the largest living representatives of the suborder, ranging in length from twenty-five to nearly thirty-four inches. They differ from the typical Pigeons in a number of marked features, as the possession of an erect fan-shaped crest on the top of the head, a tarsus covered all over with small hexagonal or nearly rounded scales, and the absence of oil-glands, cæca, and gall-bladder, as well as a tail of sixteen feathers instead of the normal number of twelve. In the manner of nidification they also differ, the period of incubation being about sixteen days in the typical Pigeons and twenty-eight days in these.

Eight or nine species of the Crowned Pigeons (*Goura*) are known, all being a bluish slate-gray in color, often with more or less of chestnut on the back and wing-coverts. In four of the species the feathers of the crest have the barbs entirely loose, while in the others they are spatulate or club-shaped at the tips. But little is known regarding the habits of these birds beyond the fact that they frequent the ground in search of their food.

Recently a handsome small Crowned Pigeon (*Microgoura meeki*) has been

GREAT CROWNED PIGEON
(*Goura coronata*)

discovered in the Solomon Islands. This bird has the bluish gray chest and mantle of the others, while the rump is grayish brown, the primaries drab-brown, the secondaries dull cinnamon, and the tail dark purple. The crest is large, flat, and composed of feathers with segregated barbs, and the feathers of the wing are particularly hard and stiff. It is a ground-haunting species, feeding on fruits and seeds, and is said to lay a single, rich cream-colored egg.

Fig. 143. — Tooth-billed Pigeon, *Didunculus strigirostris*.

The Tooth-billed Pigeon (Subfamily *Didunculinæ*). — This bird, by all odds the most anomalous and peculiar of the living representatives of the group, enjoys the distinction attained by relatively few birds of representing in itself a species, genus, and subfamily. It is between twelve and thirteen inches in length, with a compact body, rather short, stout legs, and a high, hooked bill, which is toothed or serrated near the tip of the lower mandible, while the nostrils open obliquely, in which feature it differs from all known Pigeons; there are also a number of peculiarities in the anatomical structure. The plumage of the head, neck, and upper part of the back is greenish black, while the back, wings, tail, and upper tail-coverts are chocolate-red, and the remainder of the under parts brownish black. The legs and feet are bright

scarlet, the bill bright orange-red shading off near the tip with very bright yel- and the naked space about the eyes is also bright orange-red.

Entirely confined to the Samoan Islands, the Tooth-billed Pigeon (*Didunculus strigirostris*), was apparently first brought to scientific attention by the naturalists of the Wilkes Exploring Expedition, who obtained it about 1839, although the full results of this expedition were not published until some years later. They found it at that time a very rare bird and were able to procure only three specimens, although they learned from the natives, who called it the *manu-mea*, or Red Bird, that it had formerly been very abundant. The islanders, it appears, are very fond of pets, and some years previously had secured numbers of domestic cats from the whaling ships that habitually stopped there. These cats, not taking kindly to the native diet, had begun foraging for themselves, and soon became entirely wild, subsisting largely on the *manu-mea*, with the result that it was soon practically exterminated; it was also esteemed for food by the natives, who killed it whenever possible. Before the advent of the cats it was largely a ground-haunting bird, spending most of its time, and even building its nest, on the ground, and thus fell an easy prey. But after nearing the verge of extinction the few survivors appear to have adopted or returned to arboreal habits, feeding, roosting, and building their nests well up in the trees, and it is now said to be rapidly increasing in numbers, and apparently no longer threatened with extermination. The food of the Tooth-billed Pigeon consists largely of the fruits of a fig, a kind of banyan which frequently spreads itself over an area of one or two hundred feet. When flushed it rises with a tremendous rushing noise that has been likened to the sound of distant thunder, and there is a tradition among the natives that a war party was once turned back in dismay by a flight of these birds. It is a shy bird under all circumstances and has never been kept as a pet by the islanders, as are many of the other Pigeons, for it never becomes reconciled to captivity. A number of specimens have been taken alive to Australia, the first about 1861, and at least three have been seen alive in Europe, but it is never an attractive cage bird. Of its appearance in captivity Dr. Bennett says: "It kept steadily looking at me during the time I was examining it, uttering occasionally a plaintive *goo, goo, goo.* When any one approaches the cage it will sometimes retire to an obscure corner, but at other times will remain quiet on the perch, watching every movement of the spectator. It invariably feeds in the light, but will not do so if any one is present. It usually kept on a low perch, but when disturbed would jump on the ground and run rapidly about, and then take refuge in the darkest corner of the cage. During the whole time the bird was in my possession it never became domesticated, nor evinced the slightest attachment to the lady who daily fed it; it was the same to her as to a stranger."

CHAPTER XXIV

THE CUCKOO-LIKE BIRDS

(Order *Cuculiformes*)

THIS order is the last great group in which the ambiens muscle, already spoken of as being of high classificatory value, is present, in addition to which all possess a "yoke-toed" (zygodactylous) foot, and the bridged or desmognathous type of palate. This so-called "yoke-toed" condition is brought about by the first and fourth toes being permanently directed backward, a manner quite different, it will be recalled, from the way in which it is accomplished in the Trogons, though similar to the arrangement in Woodpeckers, Puff-birds, Barbets, etc., and on which account they were all formerly placed together. However, the arrangement of the deep tendons of the foot is sufficient in conjunction with the above-mentioned characters to distinguish the *Cuculiformes*, and is very different from that in the Woodpeckers and allied forms. In these tendons the anterior portion splits into three branches, which supply respectively the second, third, and fourth toes, while the posterior portion supplies only the hind toe, the two tendons being bound together by a band (*vinculum*). This type of tendon arrangement is of quite common occurrence, being that which obtains in Gallinaceous birds, — Herons, Cranes, Rails, Gulls, Auks, etc., — and differs from that in the passerine birds simply in having the tendons bound together by a vinculum or band.

The *Cuculiformes* embraces two suborders, — the *Cuculi*, or Cuckoos, and Plantain-eaters, and the *Psittaci*, or the extensive group of Parrots. In the first suborder the young are born naked and do not pass through a downy stage before acquiring their feather covering, while in the typical members the contour feathers are without an aftershaft, and the oil-gland is present but nude. The tail-feathers are normally ten in number, but in some New World forms there are but eight. In the Parrots (*Psittaci*), on the other hand, the young pass through a downy stage, the contour feathers possess an aftershaft, and the oil-gland is usually present and tufted, though entirely wanting in a few genera. As regards the tail-feathers, the normal number is twelve, a single Papuan genus possessing fourteen. Of the structural characters it may be mentioned that the Parrots possess the permanently zygodactylous feet, a movable upper mandible, and a short, stout, strongly hooked bill, while there are no cæca and the gall-bladder is usually absent.

THE CUCKOOS

(Family *Cuculidæ*)

Taking everything into account, the Cuckoos comprise a very remarkable and interesting group of birds, being for the most part birds of shams and pretenses, and ever seeking to convey the impression that they are other than they really are. Thus the Drongo-Cuckoo of India so exactly imitates in size, form, and color the King Crow, or Drongo-Shrike, that it is nearly impossible to distinguish them unless held in the hand. Some of the so-called Ground Cuckoos of the Old World imitate Pheasants in gait and plumage, while others are hardly to be distinguished from the smaller Toucans, and still others resemble small Hawks, and take advantage of the resemblance also. In Central America the so-called Squirrel Cuckoos (*Piaya*) strikingly resemble squirrels as they scurry along limbs and jump from tree to tree. In notes, too, they often imitate other birds, and Mr. Whitehead especially speaks of a Cuckoo found by himself in North Borneo that had notes like those of a certain Barbet, and, he adds, "I have often stalked the supposed Barbet and shot a Cuckoo."

But the resemblance of plumage, voice, and habits between Cuckoos and other birds by no means exhausts their peculiarities. The paternal instinct, which is usually so highly developed in birds, is at a very low plane in the Cuckoos, since in perhaps a majority of the species the birds do not mate and are parasitic, that is, they deposit their eggs in the nests of other birds and permit their young to be reared by foster parents. And even the young seem to be born with traits which, if developed in a human being, would brand him with the mark of Cain, for more than once have they been observed to push a foster brother over the edge of the nest!

European Cuckoo. — As the parasitic habits of the European Cuckoo (*Cuculus canorus*) have perhaps been more closely studied than in any other species, the following rather complete account may be given, quoted in the main from Mr. W. H. Hudson's admirable "British Birds." He says: "One of the strangest facts in the strange history of this bird is that the egg is not laid in the nest in which it is found, but is carried by the Cuckoo in her bill and placed there. It is very small for so large a bird, although much larger in most cases than the eggs it is placed with, as its favorite nests in this country are all of small birds — Hedge-Sparrows, Reed-Warblers, Pied Wagtail, and Meadow Pipit. The eggs are very variable, being dull greenish or dull reddish gray, with spots and mottlings of a deeper shade. In some instances the Cuckoo's egg resembles in color the eggs it is placed with, and it is thought by some naturalists that the female Cuckoo invariably deposits her eggs in the nests of one species. As a rule only one egg is laid in a nest, and a few days after the eggs are hatched the young Cuckoo gets rid of his foster brother by getting him on to his back, which is broad and hollow, and throwing him over the side of the nest. If any unhatched eggs remain in the nest, he gets rid of them in the same way." This habit of eject-

ing the other occupants of the nest has been recently abundantly confirmed for various Australian Cuckoos.

From very reliable authority it appears that the European Cuckoo may lay as many as twenty eggs in a season, scattering them one or rarely two in a place, and at intervals of several days, the nesting season extending over a period of about two months. Mr. Hudson rather discredits the notion that Cuckoos may lay eggs which imitate in color and markings those of the bird they are deposited with, but Dr. Sharpe of the British Museum insists that they do this. He says: "The variability in the coloration of the eggs is well known, and it appears that in each individual the coloration of the egg is hereditary. That is to say, the Cuckoos brought up by Meadow Pipits always select that species to be the foster parents of their own young in course of time, the same being the case with regard to Hedge-Sparrows, Wagtails, and other victims of the Cuckoo." This view seems to find support in the statement of Mr. Hartert, another eminent European ornithologist, who gives as his opinion that one female Cuckoo always lays similarly colored eggs, in proof of which he exhibits thirty-one clutches of eggs that were known to have been laid by certain birds. If the shape of the nest permits, the egg is deposited directly in it, but otherwise it may be laid outside and placed in the nest with the bill of the bird, an egg of the owner being often removed to make room for it. As evincing a gleam of the maternal instinct it is a matter of apparently authentic record that the European Cuckoo may occasionally rear its own young; it is very exceptional, however. To their credit be it said, that the common North American Cuckoos enjoy a much better reputation, for they not only usually build a nest for themselves and rear their own young, but are credited with a considerable degree of affection for each other.

But to return to a broader consideration of the group, it may be said that in general Cuckoos are birds of small or moderate size, the plumage in perhaps the majority of cases being brownish or gray, usually more or less barred below, but there are some notable exceptions in which the plumage is a beautiful emerald-green or even black. Ornamental crests and tufts of feathers, while by no means the rule, are present in a few forms, and the wing-quills are occasionally produced into filiform extremities, while the bare spaces on the cheeks and about the eyes are often brilliantly colored. A majority of the Cuckoos are arboreal, a few, however, being strictly terrestrial. In distribution they are practically cosmopolitan, though most abundant in warm or tropical lands and having but few representatives in the colder regions. They number upward of two hundred species and subspecies, disposed in about forty-five genera, and are distinguished from their nearest relatives, the Plantain-eaters, by the naked oil-gland. The family has been divided into six subfamilies, though this disposition has not been accepted by all systematists.

Typical Cuckoos. — In the typical Cuckoos (*Cuculinæ*), which embrace some twenty genera and very nearly half of the total number of species, the wing is long, pointed, and flat, and does not fit closely to the body, while the tarsus is more or less feathered in front. With very few exceptions, among them the American genus *Coccyzus*, the members of this subfamily are parasitic, especially

the so-called true Cuckoos (*Cuculus*), the habits of one species of which have already been given. These birds to the number of about a dozen species are widely spread throughout the whole of the Old World except Polynesia, and may be known by the usual grayish or brownish Hawk-like plumage and the fan-shaped tail, while the closed wings extend beyond the upper tail-coverts. They are birds about ten or twelve inches long, of swift, very Hawk-like flight and peculiar resonant call notes, that of the common Cuckoo (*C. canorus*), together with an allied South African species (*C. gularis*), having the well-known *cuckoo* call. Their food consists mainly of caterpillars, grubs, worms, and soft-bodied insects, and all are more or less migratory, some being particularly so. Thus the common Cuckoo is found in summer over all of Europe up to or possibly beyond the Arctic Circle, as well as in northern Asia, and retires in winter to Africa, the Indian peninsula, and the Malay countries. It is a shy, wild bird, often heard but seldom seen, due in part doubtless to its continued persecution by ignorant people, who assert that it turns into a Hawk during the winter months. To the eastward the place is occupied by the closely related Himalayan Cuckoo (*C. saturatus*), which differs by its smaller size and stouter bill, and the Gray-headed Cuckoo (*C. poliocephalus*), which is still smaller and much darker colored. The latter species is also a very shy bird, frequenting the borders of the old forests and giving frequent voice to its peculiar and decidedly unmusical call. The Indian Cuckoo (*C. micropterus*) is known by its dark brown upper parts and paler tail, which has a broad subterminal band of black. It is a migratory species with a fine melodious call, but its breeding habits remain practically unknown. The most marked of the African species is the Black Cuckoo (*C. clamosus*), distinguished at once by its glossy greenish black plumage and white-tipped tail. As its technical name indicates, it is a noisy bird, the note being very loud and harsh, and it is also an excessively shy, active bird, flitting about in the tops of the lofty trees, and is secured with great difficulty.

Hawk-Cuckoos. — Differing structurally from the last genus in having relatively shorter wings are the Hawk-Cuckoos (*Hierococcyx*), which are remarkable for the close resemblance in flight and plumage to the Sparrow-Hawk, the likeness being so close as to cause the greatest alarm among all small birds when one appears. Even the plumage of the young birds resembles that of several immature birds of prey. The coloration is grayish above and more or less brownish or rufous below, with the tail strongly black-banded and the large eyes yellow. There are seven species of Hawk-Cuckoos which range from eastern Siberia to India and the Malay Peninsula and islands, four species being found in India proper, the best-known being the common Hawk-Cuckoo (*H. varius*). This is a resident bird wherever found, except perhaps in Ceylon, and frequents well-wooded country, feeding largely on caterpillars, but also, it is said, on fruits and buds. The nesting season extends from April to June, and the eggs, which are blue in color, are deposited chiefly in the nests of Babblers. Its "loud crescendo notes," as Jerdon terms its calls, are frequently heard both by night and day, at least during the nesting season. The largest of the group is the Great Hawk-Cuckoo (*H. sparvierioides*), a bird some fifteen

and a half inches in length, though the females are somewhat smaller. Its habits and notes are similar to those of the last species, except that it appears occasionally to build a slight unlined nest of sticks and to lay three or four whitish, slightly speckled eggs; it is mainly parasitic, however.

Violet and Emerald Cuckoos. — Passing over the little Plaintive Cuckoos (*Cacomantis*), the dozen species of which range from India to Australia and the Fiji Islands, and which are so called from their mournful *whĕ whēw, whĕ-whē-ē-w*, or some similar note, the allied Banded Bay Cuckoo (*Penthoceryx sonnerati*), which is alternately barred with rufous and blackish brown, brief mention may be made of the beautiful Violet and Emerald Cuckoos (*Chalcococcyx*) of the Oriental and Australian regions, of which there are fifteen or eighteen species recognized, and in which the sexes are distinctly different in coloration and the females usually smaller in size. They are small birds, mostly between five and six and a half inches in length, the males exhibiting brilliant colors with a metallic luster. Thus in the Violet Cuckoo (*C. xanthorhynchus*) the male is glossy violet above with blackish brown wings, and alternately barred below with white and violet or green, while the female is greenish or coppery bronze above and alternately barred with bronze green below; in the males the bill is orange-yellow and the iris red. They are silent birds, quiet in their movements, and frequent dense groves.

Golden Cuckoos. — Hardly to be distinguished structurally, but having the under sides of the wing-quills barred instead of nearly plain, are the handsome Golden Cuckoos (*Chrysococcyx*) of the Ethiopian region, the commonest of the three or four species being the true Golden Cuckoo (*C. cupreus*) of tropical Africa, in which the upper parts are metallic green, changing to golden green, while the sides of the head, throat, and under parts are white, barred on the sides with dusky bronze; its length is eight and a half inches. Although fairly abundant in many parts and constantly uttering their mournful call of *di-di-di-didrie*, they are very shy and difficult of approach, Mr. Layard stating that he was only able to procure three examples in as many months. "When calling," he says, "they perch on the summit of some dead branch, ready to do battle with any male, or engage in an amorous chase after any female that comes within their ken. They pursue each other, often with great ardor, turning, twisting, and dashing about with much rapidity." The African Emerald Cuckoo (*C. smaragdineus*) is a brilliant metallic green above and on face, throat, and fore neck, and bright golden yellow below.

The **Drongo-Cuckoos** (*Surniculus*) are so named from the extraordinary resemblance in structure and coloration to the Drongo-Shrikes, or King Crows (*Dicrurus*), the plumage being mainly black throughout, while the tail appears forked from the fact that the lateral feathers, although not much if any longer than the others, are curved outward. Of the three species, which range throughout the greater part of the Oriental region, the best-known is the Drongo-Cuckoo (*S. lugubris*), a bird about ten inches long, with the black plumage marked with a changeable green and purple gloss, the effect of which is heightened by the usual presence of several pure white feathers on the nape. They are quiet,

tame birds, feeding on caterpillars, beetles, and seeds, and having, according to Legge, "a remarkable human whistle of six ascending notes, as of some one practicing a musical scale."

American Cuckoos. — Whereas in the preceding genera the nostrils are round, in the American Cuckoos (*Coccyzus*) they are oval, in addition to which the plumage is plain brownish gray or grayish brown above, often with a faint bronzy luster, and white, buffy, or ochraceous below. The dozen or more species range from northern temperate North America through Central America and the West Indies to Patagonia, North America laying claim to five forms. Of these the Yellow-billed and Black-billed species (*C. americanus* and *C. erythrophthalmus*) are common birds throughout most of eastern North America, and are distinguished, as may be presumed from their vernacular names, by the color of the bill. They are rather shy birds, frequenting open woodland, but often appearing in orchard and shade trees about human habitations, where, as Coues says of the Yellow-billed bird, "they pass from one tree to another stealthily, with rapid, gliding, noiseless flight, and often rest motionless as statues for a long time, especially when crying out, or when they have detected a suspicious object. They court the seclusion of the thickest foliage," and are much more frequently heard than seen. Their notes, uttered at intervals during the day and occasionally at night, are quite varied but extremely difficult to describe, one of the commonest being low *noo-coo-coo-coo*, and another that sounds like *cow-cow-cow* or *kow-kow-kow*. The calls are supposed by many to be indicative of the approach of rain, whence the birds are often called Rain Crows or Rain Doves. Mr. Brewster thinks it possible to distinguish between the notes of the two species, those of the Black-billed species being softer, but the late Major Bendire did not think it could be done. In any event the habits of the two are very similar and the notes so close that none but an expert could presume to separate them. While both species build their own nest, this being a very frail structure of twigs, usually placed in low trees or vines, there is some evidence to show the parasitism so common in Old World forms is at least latent and now and then crops out, for eggs of the Yellow-billed have been found in the nest of the Black-billed form, and *vice versa*, as well as in nests of other birds, but it is by no means the rule. The eggs, which are pale greenish blue in color, number from two or three to five, rarely more, and are usually deposited at intervals of several days, on which account it is not rare to find fresh eggs in the same nest with partially incubated eggs or young in various stages of growth. Both species are of great economic value, as their food consists almost entirely of caterpillars, especially those making a nest or "tent," and vast numbers are destroyed, as many as forty to seventy having been taken from the stomach of a single bird.

In western North America, from Colorado to Oregon, southward over the tablelands of Mexico, the place is occupied by the California Cuckoo (*C. a. occidentalis*), a larger, stouter-billed form, and in Florida there are two forms, — Maynard's Cuckoo (*C. maynardi*) and the Mangrove Cuckoo (*C. minor*), the latter ranging nearly throughout the Antilles, Central America, and northern

South America. The more strictly South American forms do not differ greatly in appearance, habits, notes, etc., from those already described.

Crested Cuckoos. — We may now return to the Old World for a brief view of the final genus of this subfamily that space will permit us to notice, namely, the Crested Cuckoos (*Clamator*), of which there are nine species, ranging throughout Africa, southern Europe, and southern Asia. They are distinguished at once by the possession of a pointed occipital crest, and also by a very long, graduated tail. The only European representative is the Great Spotted Cuckoo (*C. glandarius*), which attains a length of sixteen inches, and is ashy brown above, pale gray on the head, buff on the sides of the neck and white beneath, the wings being conspicuously white-spotted and the tail-feathers tipped with white. In its habits it resembles the common European Cuckoo, and, Mr. Dresser states, "is quite as wild and shy." It has a variety of loud, harsh notes, and is parasitic, depositing its eggs in the nests of Magpies, Hooded Crows, and Ravens.

Coucals. — The second subfamily (*Centropodinæ*) embraces only a single genus (*Centropus*) and about forty species of large or medium-sized, ground-haunting Cuckoos, known as Coucals, the most marked peculiarity of which is an extremely long, nearly straight hind claw. They are of wide range, extending throughout the Ethiopian and Oriental regions as well as Papua and Australia, and have short, rounded wings, long, graduated tails, and the head, neck, and breast clothed with harsh spinous feathers. The common Coucal, or Crow-Pheasant (*C. sinensis*), is a large bird over twenty inches long, with the whole plumage, except the wings, black throughout, these together with their coverts being chestnut. Practically all its time is spent on the ground, in cultivated areas, waste land and bushy jungle, or sometimes the forests, where it seeks its sustenance of insects and probably lizards, small snakes, etc., a constant habit being the elevation of its large tail over the back. The nesting season extends from June to August, and according to Hume, Blanford, and others, it makes a "huge globular nest of twigs, green and dry leaves, and coarse grass, generally, but not invariably, with a lateral entrance, and placed in a thick and often thorny bush or tree. The eggs are broad, regular ovals, white and covered with a chalky layer; they are usually three in number." Its flesh is by many considered a great delicacy.

Koels. — On the ground of possessing a naked tarsus, short, rounded wings, and a generally long, broad, and well-graduated tail, certain forms have been set aside as forming the subfamily *Phœnicophainæ*, among them the Koels (*Eudynamis*), so called in imitation of their call note. The Koels, of which there are some six or seven species, range throughout the Oriental region and thence to New Guinea and Australia and have the sexes unlike in plumage, the male being black throughout and the female variously spotted and barred. The Indian Koel (*E. honorata*) is a bird about seventeen inches long, and is one of the best-known and most familiar of Indian birds, frequenting groves and trees in cultivated areas and feeding entirely on fruit. They have a rich, melodious call like the words *ku-il*, *ku-il*, and are parasitic on Grackles, Fruit Pigeons, and Crows, especially the Indian Crow (*Corvus splendens*), often placing

two or three similarly colored eggs in each nest, and when the young Koel is strong enough it manages to get rid of the young Crows by pushing them over the edge.

Red-faced Cuckoo. — The typical member of the subfamily, known as the Red-faced Malkoha (*Phœnicophaës pyrrhocephalus*), and the sole tenant of its genus, is a huge Cuckoo eighteen inches in length, with a stout, compressed, and much-curved upper mandible, with the narrow slit-like nostrils parallel with and close to the commissure, while the sides of the head are bare, and the crown and throat provided with stiff, barbed feathers. The plumage is black and metallic bluish green above and white below, and the long, graduated tail is white-tipped. It is a shy bird, sometimes seen in flocks, and keeps much to the forests and dense undergrowth; its food consists largely of fruit. This species, together with all the other members of the subfamily except the Koels, make their own nests and rear their own young in the orthodox manner; it is found only in Ceylon.

Lizard Cuckoos. — Of the New World representatives of this group, mention may be made of West Indian Lizard Cuckoos or Rain-birds, especially of the genus *Saurothera*, of which there are half a dozen forms, characterized among other things by a bare vermilion patch around the eye, which is separated from the bill by a band of feathers, and by the white-tipped tail-feathers. They are large birds, the so-called Lizard-catcher (*S. dominicensis*) of San Domingo reaching a length of seventeen inches, and others are still larger. In this species the plumage is ashy brown above, ashy white on the lower throat and chest, and rufous-buff on the upper throat and remaining under parts; the wing-quills are chestnut. Of its habits Mr. Cory says: "It waits quietly, standing perfectly motionless until a lizard comes within its reach and then with surprising quickness darts upon and kills it. I have seen lizards four or five inches long killed in this way. It has a long, loud call consisting of a series of quickly repeated cries, somewhat resembling that of our Golden-winged Woodpecker."

Chestnut Cuckoo. — Of the Mexican and Central and South American genus *Piaya*, which also belongs here, the Chestnut Cuckoo (*P. cayana*) may be taken as an example, this being about nineteen inches in length, of which the tail makes up nearly or quite eleven inches, and in color is reddish chestnut throughout except for the gray breast and abdomen. It is widely spread over Central and South America, and of its habits as observed in Argentina, Mr. Hudson says: "It seems to feed chiefly if not altogether on the ground, and when perched always appears awkward and ill at ease. On a branch it sits motionless until approached, and then creeps away through the leaves and escapes on the opposite side of the tree. Its language is a loud, screaming cry, on account of which the Brazilians call it *Alma do gato*, implying that it possesses the soul of a cat. It is a very shy, retiring bird."

Road-runners. — Another group of four genera and less than a dozen species of ground Cuckoos, curiously divided between Borneo and Sumatra and the New World, comprises the fourth subfamily (*Neomorphinæ*). Structurally they are known by their powerful legs and feet, adapting them for terrestrial

life, and short, rather weak wings, in which the secondaries are as long as the primaries. One of the best-known members of the group is the Road-runner, Chaparral Cock, or Snake-killer (*Geococcyx californianus*), of northern Mexico and the adjacent portions of the United States. Nearly or quite two feet in length, it has the plumage "conspicuously striped with dull whitish or buffy and bronzed brown, the latter glossed with green," while the naked skin about the eye is brightly colored — blue, white, and red or orange — in life. The Road-runner is a rather unsocial bird, usually seen singly, or at the breeding season in pairs or family parties, and frequents especially desert tracts adjacent to river valleys and the lower foot-hills, where there is a more or less dense covering of cactus, yuccas, and thorny undergrowth, through which it runs with astonishing swiftness. When walking about at ease the long tail is somewhat elevated and the neck drawn in; but when alarmed the feathers are pressed closely to the body and it makes off, trusting almost entirely to its legs for escape; but when pressed too hard it may take to wing, flying for a short distance with comparative ease and swiftness. It feeds on grasshoppers, beetles, snails, lizards, small snakes, the smaller rodents, and young birds, and in season the fig-like fruits of the giant cactus. The rattlesnake is a well-known denison of its haunts, and there is an engaging fable to the effect that when a Road-runner discovers one of these reptiles coiled up asleep it proceeds at once to hedge it in by a ring of spiny cactus, on completing which it drops a piece on the snake, which has the effect of rudely awakening him, when he dashes about in his efforts to escape, filling his body with the sharp spines, and ultimately falls a victim to the bird. Major Bendire, whose opportunities of observing the life history of this bird were very extensive, doubts the truth of this story, and has certainly never witnessed it. The nesting season usually begins in late March or April, and the nest is ordinarily placed in low bushes, mesquite trees, cactus bushes, or sometimes the abandoned nest of some other bird. When made by themselves, it is, according to Bendire, a rather flat and shallow, but compactly built, structure of sticks and lined with finer material, such as dry grass, soft tree bark, weeds, bits of snakeskin, etc. The eggs, pure white in color, range from four to nine or even as many as twelve, in the latter case possibly the product of two birds. "The parents are devoted to their young, and when incubation is well advanced the bird will sometimes allow itself to be caught on the nest rather than abandon the eggs. The nestlings, when disturbed, make a clicking noise with their bills. When taken young, they are readily tamed, soon becoming attached to their captor, showing a great deal of sagacity and making amusing and interesting pets." — Bendire.

The only other species in the genus is the Mexican Road-runner (*G. affinis*), a smaller bird ranging from Guatemala to Yucatan and Vera Cruz.

Anis, or Savanna Cuckoos. — Passing over the several small Central and South American subfamilies, the members of which present nothing of particular interest, we come to the final subfamily (*Crotophaginæ*), also American, which is distinguished at once by the tail of only eight feathers. Although this group numbers but two genera and four species, they are all birds of much interest, and

it will be necessary to describe them quite fully. The typical members are the Anis, or Savanna Cuckoos (*Crotophaga*), the three species of which range from the southern United States through Central America and the West Indies to Peru and Argentina, and are characterized by a very deep and compressed bill, a uniform blackish plumage, and the absence of an occipital crest. The Black Ani, Blackbird, Savanna Blackbird, or Tick-bird (*C. ani*) is mainly a native of the West Indies and eastern South America, its only claim to be considered North American resting on its casual or fortuitous occurrences in southern Florida and Louisiana. We may, however, quote from the very full account of Mr. C. B. Taylor, who observed the bird in Jamaica. He says: "It is one of the commonest birds near Kingston; and in most open and sparsely wooded lands, or in the vicinity of cultivated clearings, little groups or companies may nearly always be seen. Blackbirds are invariably present where cattle are pastured. I cannot recollect an instance in which I have noted a herd of cows at pasture without a flock of these birds appearing in company with them or in their immediate vicinity. This association is doubtless chiefly for the purpose of feeding on the ticks and other parasites on the animals, a good work largely shared by the Grackles. It is most interesting to watch a company of Blackbirds when thus engaged. Many are perched on the backs of the cattle (two or three sometimes on one cow), others are on the ground, hopping about fearlessly among the grazing herd, searching for insects at the roots of the herbage or capturing those disturbed by the feet of the cattle. Insects of all orders and their larvæ, ticks, grubs, etc., form their chief food. Occasionally, perhaps, a few small lizards are taken, and, I believe, the eggs of other birds.

"Their nesting habits are exceedingly curious and interesting. Many individuals (possibly members of one flock) work together in the construction of one large nest in which all the females of the company lay their eggs. The number of eggs deposited in different nests varies greatly, but is, of course, dependent on the number of birds in the company. Six and eight eggs are commonly found. I once took eleven, and in August last year (1891) I saw a clutch of twenty-one that had been taken from a single nest! It is probable that normally not more than two eggs are deposited by each bird, but nothing definite can be said on this point. The nest, which is usually placed high up in a tall tree, is a large, loosely constructed mass of twigs, entirely lined with dried leaves. But the most remarkable circumstance in connection with the nesting of these birds is the disposition of the eggs in *regular layers* with leaves between. This custom I had long heard of before an opportunity offered for personal observation. In the first nest I examined the eggs were in two distinct layers, separated by a deep bed of dry leaves; the bottom layer consisted of four eggs, and these, strange to say, were all infertile. I believe this singular habit is practiced in all cases where a large number of birds resort to the same nest. The eggs are a deep bluish green, but when freshly laid are covered with a white chalky coat which soon becomes much scratched and erased on all. Now what seems very singular is that comparatively little of this chalky covering gets rubbed off the sides, when from turning over the eggs in the nest we should expect to see the greatest extent

of denudation, whereas one or both ends are nearly always denuded. . . . I have found eggs and young in February and throughout the succeeding months to August, two or three broods probably being reared. I have also seen young, fully fledged but unable to fly, hopping about the branches of the nesting tree."

The Groove-billed Ani (*C. sulcirostris*), which is so named from the presence of several distinct longitudinal grooves on the upper mandible, extends from the lower Rio Grande Valley in Texas and Lower California to Peru, while the Great Ani (*C. major*) is found only in South America; it is distinguished at once by its large size, its total length being from eighteen to twenty inches as against twelve or thirteen in the other species and more glossy plumage. The habits of these are similar to those of the Black Ani.

The **Guira Cuckoo** (*Guira guira*) of Brazil, Paraguay, and Argentina is known from the other members of the subfamily by the slender bill and crest of long feathers. It is a rather handsome bird, about sixteen inches long, dark brown above, becoming rufous on the crest, white on the rump, and dull white below, with the feathers of the throat and breast marked with long, narrow shaft stripes. The square tail is nine or ten inches long, the two middle feathers being dark brown, and the others three-colored, being buff at the base, dark glossy green in the middle, and white at the tips, and as it is spread out like a fan when the bird is flying, it "forms a conspicuous and beautiful object." A very complete account of this species is given by Mr. Hudson, from which it appears that in Buenos Ayres it is one of the few resident birds that suffer much from the cold, it being a common sight to see a dozen or twenty of them clustered together three or four deep on a horizontal branch of a tree sheltered from the wind, where they pass the night. "If the morning is fair," he says, "the flock betakes itself to some large tree, on which the sun shines, to settle on the topmost twigs on the western side, each bird with its wings drooping and its back turned toward the sun. In this spiritless attitude they spend an hour or two warming their blood and drying the dew from their scant dress. . . . With the return of warm weather this species becomes active, noisy, and the gayest of birds." The nest, a large rough structure of twigs and lined with green leaves, is placed usually in a thorny bush, and the eggs, six or seven or exceptionally as many as fourteen in number, are an exquisite turquoise-blue, roughly reticulated or laced with a snow-white, soft, calcareous substance which is easily removed or soiled. The young, however, are extremely ugly and the nest and themselves are soon in a very unclean and ill-smelling condition.

THE PLANTAIN-EATERS

(Family *Musophagidæ*)

Most closely related to the Cuckoos, at least as worked out in the system we are following, are the Plantain-eaters, or Touracos, a small group of often brilliant and curious birds, mostly with handsome erectile crests, confined in

their distribution to the continental portion of the Ethiopian region. Between fifteen and thirty inches in length, they are separated from the Cuckoos by having the oil-gland tufted, the contour feathers with a large aftershaft, and the feet semizygodactylous, that is, with the outer or fourth toe capable of being turned either backward or forward, while the cæca are absent, and the neck vertebræ fifteen instead of fourteen. To be more specific regarding them, they are birds with a relatively long neck, large eyes, and rather stout, broad bill in which the upper mandible is more or less serrated along the cutting edge, while the wings are short and rounded and the rounded tail is composed of ten feathers.

The general coloration of the plumage consists mainly of metallic greens, blues, or light browns, usually with much of crimson and occasionally yellow, and the plumage, according to Church and others, is remarkable in that it contains a peculiar pigment known as *turacin*, which is so soluble in water that it is actually washed out when the feathers are wetted, as when the birds are washed by a heavy rain or enter the water for a bath. In the latter case they are said to impart a distinct color to the water, but in a very short time the normal color is restored to the feathers.

The Plantain-eaters are for the most part very noisy birds, going about in pairs or small, perhaps family, parties, and keeping much to the tops of the highest forest trees, though not infrequently coming down to the dense tangle of shrubs and creepers. They are in general shy, restless birds, found in proximity to water, either tidal or inland, and feeding on fruits such as tamarinds, bananas, plum-like fruits, and occasional insects, worms, snails, and even young birds. Of the Blue Plantain-eater (*Schizorhis zonura*) as observed in the Victoria Nyanza region, Sir Harry Johnston says: "But for the bird's noisy habits its coloration would be very protective, as when he keeps still amongst the branches he cannot be distinguished from their brown, gray, black, and white, while the lemon-colored beak looks like a ripe fruit." During the intense heat of midday or when rain is falling they are fond of secreting themselves within the dense canopy of leaves and boughs just below the tree-tops, and at such times their crests are recumbent; but when they are approached the crest is immediately erected and they run along the branches peering at the intruder and uttering their usual harsh cries. If not much alarmed, they fly to a short distance, with crests still erect and the tail more or less elevated, where they assure themselves of their safety. The nesting habits are not very well known, as it is extremely difficult to discover the nests of birds haunting the dense forests, but from such information as we have it appears that they construct a slight platform of sticks, much like the ordinary nest of a Dove, and usually at no great height from the ground. It has been said that some of the species deposit the eggs in holes in trees, but this appears to lack confirmation. The eggs, apparently two or three in number, are greenish or bluish white, so far as known.

The sexes in Plantain-eaters are practically the same in coloration, and in most of the forms the orbits are naked, a feature which is carried to the extreme in *Gymnoschizorhis*, which has the cheeks and throat bare. About thirty-five species of Plantain-eaters are known, being disposed among half a dozen genera, the

largest and most important genus being *Turacus* of tropical and southern Africa, which embraces no less than twenty-three species. This genus is distinguished by having the oval nostrils concealed, the green crest often tipped with white or crimson, and the quills crimson and black, one of the handsomest and best-known species being the White-breasted Plantain eater (*T. corythaix*) of South Africa. This bird, commonly called the Lori, is seventeen or eighteen inches long, and mainly glossy greenish, marked on the back and wings with blue, while the large crest is tipped with white and the eye is enclosed above and below by white bands. When the wings are spread they show a brilliant carmine, glossed with purple, while the bill is orange-brown, the legs and feet black. This species,

Fig. 144. — White-eared Plantain-eater, *Turacus leucotis*.

according to Dr. Sharpe, feeds on fruits and frequents the highest trees, rarely if ever descending to the ground, on which it can, however, travel with great rapidity if brought down by a shot. Their motions are very graceful and light and performed with a rapidity that delights the eye of the beholder.

In the typical Plantain-eaters (*Musophaga*), of which there are two species, both of West Africa, the base of the bill is prolonged backward over the forehead into a kind of shield, and the wing-quills are crimson as in the last genus. The best-known species (*M. violacea*) is a beautiful bird about eighteen inches long, with the general plumage a rich, glossy violet-purple, and the top of the head and the bare space around the eye a deep crimson, the latter set off by a broad white band beneath the eye.

The largest member of the family is the Great Plantain-eater (*Corythæola cristata*) of west and equatorial Africa, the only representative of its genus. The

male is about twenty-eight and the female twenty-nine inches in length, both having the general plumage greenish blue, becoming black on the large crest and on the nape, the chest pale green and the abdomen rufous-brown, while the tail shows much yellow. This species frequents only the virgin forest, going about in small parties and keeping to the tops of the highest trees.

THE PARROTS

(Suborder *Psittaci*)

There is, perhaps, no other group of birds of similar rank that embraces so large a number of interesting and engaging members as the present, nor are there many groups more sharply circumscribed. As we have seen in so many other groups, it is the exception rather than the rule that each member falls easily within the prescribed lines of the group, there being usually "outliers" in this way or that, but not so with the Parrots, for each form, with the possible exception of the Owl-Parrot of New Zealand, measures up to the abstract idea of what a Parrot is supposed to be, and even the oldest fossil form of which we have any knowledge, occurring in the Miocene deposits of France, is just as distinctly a "Parrot" as any now living. This similarity of appearance, which every tyro recognizes, probably argues for a very ancient origin and an early loss of the links connecting them with other groups. But, although they exhibit this general similarity of structure, the individual structural elements are so variously combined that it is difficult to decide which set of characters to give most value to in attempting to fix the relationships of the group, and we can well accept the edict of Mr. Beddard, who says that "the determination of the affinities of the Parrots to other groups of birds is one of the hardest problems in ornithology." They have often been placed next the Owls, with which they appear to have many — albeit superficial — points in common, but, in the light of the fullest modern information, it appears likely that their closest relationship is with the Cuckoos and Plantain-eaters, though, to quote again from Beddard, "it must be held that they have emerged from a low stock at a time not far removed from that at which the *Cuculi* and *Musophagi* also emerged, but that there is not a common starting of the three groups."

Although perhaps hardly necessary, it may be advisable to briefly set forth the principal characters of Parrots. They are birds of varying size with a rather compact body, relatively short neck and large head, and may be known at once by the permanently zygodactyl feet, the first and fourth toes being directed backward, and the short, extremely stout, strongly hooked bill, which is provided at the base with a cere, as in the birds of prey. The cere, however, is frequently feathered, which it very rarely is in the latter group. The legs are in general very short and the feet covered with granular scales, while the oil-gland when present is tufted. There are a number of other important characters, such as the articulation of the upper mandible to the skull by means of a transverse

hinge, which permits of considerable motion, and a thick, fleshy, often bushy or fringed tongue, while in all but a single genus the tail is composed of twelve feathers. With the exception of the curious Owl-Parrot (*Stringops*), the Parrots are mainly arboreal, climbing about among the branches and trunks, in which office they make considerable use of the hooked bill, as well as the distinctively climbing feet. They are usually brilliant in coloration, showing much of green, yellow, and red, with occasionally brown and black, and lay white eggs, which are deposited in holes, usually in trees but sometimes in banks, ants' nests, etc. The period of incubation is approximately twenty-one days, the males assisting to some extent, and the young are born helpless, being fed for some time by the regurgitation of partially digested food from the crops of the parents.

The *Psittaci* is a large group, comprising over eighty genera and nearly six hundred species, and is most prominently developed within the tropics, with a very few forms extending as far north as the forty-second degree of latitude and south as far as the fifty-fifth degree, within which limits they are practically world-wide in distribution, being especially rich in Central and South America, Australia, and the Pacific islands. Only two species, the Carolina Parakeet and Thick-billed Parrot, are found in North America north of Mexico, and the vast Palæarctic region is without a single representative, though once possessing them, as the fossil remains testify. Many attempts have been made to classify the group of Parrots, some of which have been based on purely external appearance, while others are founded on various anatomical characters, but none thus far proposed appears to have resulted in a thoroughly satisfactory natural arrangement. This is the more remarkable when it is remembered that material on which to prosecute investigation has been unusually abundant, since the group has long been a favorite one in captivity, both with private collectors and zoölogical gardens; but the fact remains that we are still in ignorance of the complete internal structure of a majority of the members of the suborder, and until this knowledge is forthcoming probably no really natural disposition can be made. So, to quote from Mr. A. H. Evans, we may, " in default of a really satisfactory arrangement, accept that of Dr. Gadow, who agrees in the main with Count Salvadori," who elaborated the group for the British Museum Catalogue of Birds. He recognizes two families, each with three subfamilies, in the first of which (*Trichoglossidæ*) the tip of the tongue is provided with horny filaments, while in the second (*Psittacidæ*) the tongue is smooth. The *Trichoglossidæ* includes the subfamilies *Nestorinæ*, or Nestor Parrots, the *Loriinæ*, or Lories and Lorikeets, and the *Cyclopsittacinæ*, or False Lories, and the family *Psittacidæ* embraces the *Stringopinæ*, or Owl-Parrot, the *Cacatuinæ*, or Cockatoos, and the *Psittacinæ*, or typical Parrots.

The Nestor Parrots (Subfamily *Nestorinæ*). — This is a very small group, comprising only a single genus (*Nestor*) and six nominal species, of which three are either extinct or of doubtful status. Entirely confined to New Zealand or adjacent small islands, they are birds of fair size, being from fifteen to twenty inches in length, and may be known by the compressed long bill, which is much

longer than deep and has the culmen grooved along the middle, while the base of the lower mandible is partially hidden by soft, hairy feathers which project forward; the cere is also partly covered with hairy feathers. The tarsus is relatively long and the bony ring about the socket of the eye incomplete, while the wings are long and rather pointed, the tail of moderate length, even at the tip, and with the shafts pointed and projecting beyond the webs. The tongue is provided with a fringe of delicate hairs at the extremity.

Kaka Parrot. — The only widely distributed species is the Brown Parrot (*N. meridionalis*), better known by its Maori name of Kaka in imitation of its loud cry, which is found in suitable, usually mountainous, situations throughout both islands of New Zealand. The general hue of the plumage is olive-brown above, becoming gray on the top of the head, yellowish on the ear-coverts, and purplish red on the abdomen and over the tail, while the back of the neck is provided with a band of yellowish red; the length is eighteen and a half or nineteen inches and the sexes are alike in coloration. There is considerable variation in both size and color and it is not infrequent to find them almost entirely yellow and red, or even albino. The Kaka is strictly arboreal in its habits and is a sprightly, active, eminently social, and exceedingly noisy bird, going about in small parties and making the forests resound with its wild, harsh screams. "Being seminocturnal in its habits," says Sir Walter Buller, "it generally remains quiet and concealed during the heat of the day. If, however, the sportsman should happen to find a stray one, and to wound instead of killing it, its cries of distress will immediately arouse the whole fraternity from their slumbers, and all the Kakas within hearing will come to the rescue, and make the forest echo with their discordant screams. Unless, however, disturbed by some exciting cause of this sort, they remain in close cover till the approach of the cooler hours. Then they come forth with noisy clamor, and may be seen far above the tree-tops, winging their way to some favorite feeding place; or they may be observed climbing up the rough vine-clad boles of the trees, freely using their powerful mandibles and assuming every variety of attitude, or diligently tearing open the dead roots of the close epiphytic vegetation in their eager search for insects and their larvæ. In the spring and summer, when the woods are full of wild blossoms, these birds have a prodigality of food, and may be seen alternately filling their crops with a variety of juicy berries, or sucking nectar from the crimson flowers of the rata (*Metrosideros*) by means of their brush-fringed tongues. With the earliest streaks of dawn, and while the underwoods are still wrapped in darkness, the wild cry of this bird breaks upon the ear with a strange effect." They also become more or less active during the gloomy weather, and occasionally may be seen abroad in bright sunlight, flying and circling with loud screams above the tree-tops. During the breeding season, which begins in November, the pairs are constantly in each other's company, and the nest is usually placed in the hollow trunk of a decayed tree or in a rocky crevice. The eggs, usually four but sometimes five or six, are white, and measure one and three quarters by one and a quarter inches. The Kaka is a good mimic and talker, living for many years when in captivity, and is often kept as a pet by the

Maories, though it is exceedingly destructive to clothing, furniture, and all that comes within reach of its powerful bill.

Kea Parrot. — A slightly larger and otherwise very different bird is its near relative, the Kea or Mountain Parrot (*N. notabilis*), which frequents the barren rocky summits of the snowy mountains of the South Island at elevations up to six thousand feet or well above the forests. The color is a dull olive green, each feather edged with black, while the area above the tail, under wing-coverts, and axillaries are orange-red, and there is more or less of blue on the wings, and the bluish orange tail has a broad band of blackish brown near the tip. During the warmer months the Keas frequent the rocky gullies and peaks with stunted vegetation, where they secure their food of insects, berries, fruits, and nectar, but with the advent of cold weather and when all is concealed beneath a mantle of snow and ice, they are forced to lower levels, and so they discovered some years ago the out-stations of back-country sheep herders. About these stations they found it easy to pick up a living of scraps and offal, and when a sheep was killed they picked the flesh from the head and other discarded portions, not disdaining to make a meal off the sheepskins hung up to dry. But from the office of scavenger they assumed the rôle of executioner and shortly developed the habit of killing sheep for themselves. Coming in flocks, the birds single out a sheep at random and alighting on its back tear away the wool and pick a hole in the flesh until the fat about the kidneys, of which they are greedily fond, is exposed. The animal, of course, succumbs and after a few relished bits the birds turn their attention to another victim. The Keas have greatly increased in numbers since the introduction of sheep raising, and so serious have their depredations become that it has been necessary to abandon the runs in some cases, and a price has been put upon their heads. They are also known to attack horses. In their original state they are described as very tame, inquisitive birds, easily approached and knocked over by a stone or other missile, and they are frequently caught by the settlers exposing a fresh sheepskin as bait. Their ordinary note is a mewing cry, but they also utter a "short whistle, a chuckle, and a suppressed scream, scarcely distinguishable from the notes of the Kaka." The nest is placed in the crevices of rocks and the eggs are larger and rougher than those of the former species.

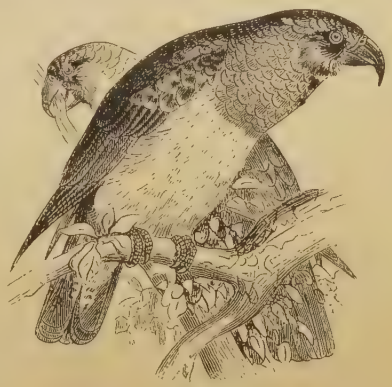


Fig. 145. — Philip Island Parrot, *Nestor productus*.

Midway between New Zealand and New Caledonia are two small islands, Norfolk and Philip, each of which was once the home of now extinct species of *Nestor*. Philip Island, the smaller of these, is only about five square miles in

area, and although Norfolk Island is only about four miles distant, neither species has been found except in its own island. The Philip Island Parrot (*N. productus*) was about fifteen inches in length and may be readily distinguished by a broad yellowish band across the breast. This bird was probably always a rare species, for the limited habitat would preclude the possibility of it ever having been very abundant. The last individual seen alive was about 1851, and of the species there remains hardly twenty skins distributed among the museums of the world. The Norfolk Island Parrot (*N. norfolkensis*) was the smallest species of the genus, being only twelve inches long, and is further distinguished by possessing the longest bill of any, this being some three and eight tenths inches in length. There are no specimens of this bird known to be preserved, and in fact the species rests entirely on a description published by Latham in 1822, and a colored drawing of the head executed by one F. L. Bauer, a botanical artist, who made it from a living specimen on Norfolk Island, January 19, 1805. The remaining species is the Count of Essling's Parrot (*N. esslingi*), only a single specimen of which has ever been obtained, and the precise place and date of capture of this are both unknown. It approaches most closely to the Kaka and is thought by some to be merely an abnormal variation of this species.

The Lories and Lorikeets (Subfamily *Loriinæ*). — Although possessing some points in common with the last subfamily, the much handsomer Lories and their relatives are distinguished by having a relatively shorter bill, which is still slightly longer than it is deep, and lacks the groove in the middle of the upper mandible, while the tongue is provided with a brush-like instead of fringed tip. They are for the most part small birds, mainly falling under ten inches in length; indeed, some are but four and a half inches long, while few exceed a foot. They have pointed wings in which the first three quills are usually the longest, and mainly graduated or rounded tails which rarely exceed and are usually shorter than the wings. The Lories number about eighty-five species disposed among some fourteen genera, and in distribution are mainly confined to the Australian region and adjacent Polynesia, many species being restricted to single, often small, islands. They are strong, rapid-flying, noisy birds, going about in flocks often of large size, and, as Gould says, "dashing among and alighting upon the branches simultaneously, and with the utmost rapidity, and quitting them in like manner, leaving the deafening sound of their many voices echoing through the woods." Their food consists largely of soft fruits, but they are also very fond of nectar, which their bushy tongues well adapt them to secure. Their eggs, four or five in number, are deposited in holes in trees.

The **Broad-tailed Lories**, so called from the fact that the feathers of the tail are broad and more or less rounded at the tip, were formerly included within a single genus, but are now disposed among half a dozen, the differences being based largely on the size and on the color of the bill and plumage. Thus in the Black Lories (*Chalcopsittacus*), of which there are seven species, all of the Papuan Islands, the plumage is purple-black, brown-olive, or rarely green, and the bill,

cere, and naked chin are black. With orange-red bills the fifteen species of Red Lories (*Eos*) are distinguished by the prevailing red color of the plumage, including the wings, while the true Lories (*Lorius*), of which there are a baker's dozen of species, have the wings green. As an example of the beautiful coloring among the latter the Purple-capped Lory (*L. domicella*) of Ceram and Amboyna may be more fully described. The general color of the plumage throughout is scarlet, darker on the back and scapulars, the top of the head deep purplish black, becoming violet on the hind head, while the breast is relieved by a broad band of golden yellow; the wings are green, becoming blue at the bend and beneath, and the tail is red with a band at the tip which is dark purple-red above and golden-red below; the length of this bird is twelve inches.

Lorikeets. — In the remaining genera of the subfamily the feathers of the tail are more or less narrowed and acute at the tip, among them being the interesting little Lorikeets (*Trichoglossus*), of which there are sixteen or more species. As an example of these we may select the Red-collared Lorikeet (*T. rubritorques*), which inhabits the coasts of Northwest Australia. It has the back, wings, and tail green, the head and cheeks a resplendent blue, and the throat and abdomen a deep olive-green, while on breast and nape there is a band of orange-red, and a broad band of deep blue crosses the hind neck. This is a common species, generally seen in flocks of large size and feeding on the summits of the loftiest forest trees. Mr. Gould speaks enthusiastically of the sight of a flock of these birds, perhaps in company with several other allied species, as they are feeding among the bright-colored flowers of a eucalyptus or other forest tree. "The incessant din produced by their thousand voices, and the screaming notes which they emit when a flock simultaneously leaves the trees for some other part of the forest, is not easily described, and must be seen and heard to be fully comprehended. So intent are they for some time after sunrise upon extricating their honey-food, that they are not easily alarmed or made to quit the trees upon which they are feeding. The report of a gun discharged immediately beneath them has no other effect than to elicit an extra scream, or cause them to move to a neighboring branch, where they again recommence feeding with avidity, creeping among the leaves and clinging beneath the branches in every variety of position." Their food consists almost entirely of honey and the buds of trees.

Passing over the still smaller Lorikeets of the genus *Glossopsittacus*, the five species of which are confined to Australia and neighboring islands and *Hypocharmosyna*, which embraces the smallest members of the group, the briefest mention may be made of the Arfak and Astrolabe Parrots (*Oreopsittacus*), whose only claim to attention is the fact that of all the Parrots they alone possess fourteen feathers in the tail. The Arfak Parrot (*O. arfaki*) is a small dark green bird with the top of the head, sides, and under wing-coverts red and the cheeks and ear-coverts dark blue.

The False Lorikeets (Subfamily *Cyclopsittacinæ*). — Standing in some respects as a connecting link between the present and the following family are the members of this little subfamily which numbers only two genera and some

twenty-three species. They are small birds of the Austro-Malayan region, mostly between six and eight inches in length, approaching closely to the last group, but differing in having the bill deeper than long and much swollen on the sides, while the outline of the lower mandible shows a strong curve. Curiously enough the nature of the tongue remains unknown.

The Owl-Parrot (Subfamily *Stringopinæ*). — The Kakapo, Ground, or Owl-Parrot (*Stringops habroptilus*) of New Zealand is the sole tenant[1] of its genus and subfamily, and is altogether the most anomalous member of the entire group of Parrots. Dr. Gadow places it first in the second family (*Psittacidæ*), while others, perhaps more correctly, have assigned it a position on the outskirts of the group and not in its very midst. Be that as it may, the Kakapo is one of the most peculiar and interesting of the many feathered anomalies to be found in the little island continent, being two feet or slightly over in length, with the entire outer plumage rather soft and lax, and the hairlike feathers about the eyes disposed somewhat in the form of a disk as in many Owls, whence, of course, its name of Owl-Parrot. The bill is short and thick, much swollen on the sides, without a notch, and has the under side of the hook provided with a file-like surface. The nostrils open in the swollen cere and the base of the bill is covered with feathers, each with its shaft prolonged into a "hair," while the bony ring surrounding the orbit is complete. The wings are short and rounded, the tail long, rounded, and with each feather pointed. In color the plumage is green, varied with brown above and yellow-green varied with brown and yellowish white below. A further marked peculiarity of the skeleton is an incomplete sternum and a very much reduced keel, — in fact, this is almost absent, for the bird is a very poor flyer, spending most of its time on the ground, and furthermore is practically nocturnal in its habits.

FIG. 146. — Kakapo, or Owl-Parrot, *Stringops habroptilus*.

The Kakapo, according to native tradition, was once a very abundant bird in New Zealand, being found on North and South islands, but it has long since disappeared from the latter island, and is now so greatly reduced in numbers on the other as to be threatened with extermination. Its decadence is but another example of a native species going down before civilized man or the predaceous animals introduced by him.

According to recent writers on New Zealand birds, the Kakapo has a fondness for open mossy glades in beech forests, as well as more open hillsides, where it

[1] The species known as *Stringops greyi* rests on a single worn specimen, and is usually regarded as merely a slight color variety of the other.

finds sufficient cover amongst the rocks. The following account is from Sir George Grey: "During the day it remains hidden in holes under the roots of trees or rocks, or very rarely perched on the boughs of trees with a very dense, thick foliage. At these times it appears stupid from its profound sleep, and if disturbed or taken from its hole, immediately runs and tries to hide itself again in a heap of soft dry grass. About sunset it becomes lively, animated, and playful, issues forth from its retreat, and feeds on grass, weeds, vegetables, fruit, seeds, and roots. When eating grass, it grazes rather than feeds, nibbling the grass in the manner of a rabbit or wombat. It sometimes climbs trees, but generally remains upon the ground, and only uses its short wings for the purpose of aiding its progress when running, balancing itself when on a tree, or in making a short descent — half jump, half flight — from an upper to a lower bough. When feeding, if pleased with its food, it makes a continual grunting noise. It is a greedy bird, choice in its food, showing an evident relish for anything of which it is fond. It cries repeatedly during the night, with a noise not very unlike that of the Kaka, but not so loud. The Kakapo is a very clever and intelligent bird, in fact, singularly so; contracts a strong affection for those that are kind to it; shows its attachment by climbing about and rubbing itself against its friend; and is eminently a social and playful bird. It builds in holes under trees and rocks and lays two or three white eggs about the size of a pullet's in the month of February."

The Cockatoos (Subfamily *Cacatuinæ*). — Quite different from any we have thus far considered are the Cockatoos, which form a small group of some half a dozen genera and thirty species, having their headquarters in the Australian region, whence they extend to the east as far as the Solomon Islands, north to the Philippines, and west as far as Celebes and Lombok. They are mostly birds of large size, indeed among them are some of the largest members of the entire suborder, their most marked external characteristic being the possession of a long frontal crest, which serves to distinguish them from all other Parrots, except the genus *Nymphicus*, which is also crested. The bill is short and very much deeper than long, with the upper mandible gradually much compressed, the hook being nearly perpendicular and provided underneath with a file-like surface. As already pointed out, the tongue is simple and smooth. The bony ring which surrounds the socket of the eye is complete and has a process extending from the lower part backward to the base of the skull, the latter a character which serves at once to distinguish the Cockatoos from the true Parrots (*Psittacinæ*). The tarsus is always short, and the cere through which the nostrils open is not much swollen and is generally naked, though sometimes feathered. The coloration of the plumage in the Cockatoos is also quite different from that in other Parrots, the prevailing color being white, occasionally gray or dark blackish brown, though often exhibiting traces of red or yellow, especially on the crest, breast, and under surface of the tail. In any event, the characteristic Parrot-green is absent, except as a faint tinge on the wings of one species.

The Cockatoos are social birds, going about at all seasons of the year in flocks

often of great size, and frequenting for the most part the tops of the highest forest trees or occasionally sailing to an immense height in the cloudless tropical sky. They are mostly vegetarians, feeding on nuts, seeds, grain, bulbs, and roots, varied with occasional insects or their larvæ. Their eggs are deposited in holes in trees or in the crevices of rocky cliffs. Their handsome plumage, so well set off by the large, often bright-colored crests, and their engaging manners have long made them favorites as household pets and for the aviary, though their linguistic ability is rather limited, being confined in the main to the imitation of various domestic animals, such as the dog and cat, as well as domestic fowls; occasionally, however, they are excellent talkers. The chief drawback to keeping them as pets is their discordant screaming, though some species are worse in this respect than others.

FIG. 147.—Great Black Cockatoo, *Microglossus aterrimus.*

Great Black Cockatoo.—We may appropriately begin the consideration of the group with the Great Black or Palm Cockatoo (*Microglossus aterrimus*) of North Australia and Papuan Islands, which is distinguished at once from all the other members of the subfamily by having the cheeks entirely naked. The most striking characteristic of this species is the enormously large and powerful bill with almost needle-like point. It is also the largest of the group, attaining a length of twenty-eight to thirty-two inches, of which about ten inches is made up by the tail. The crest, composed of narrow feathers, is very long, and the plumage is slaty black, powdered with gray, becoming deep velvety black on the head and lores, while the naked cheeks are pale red bordered by pale yellow. The female is similar but smaller than the male, and the young birds exhibit a series of narrow yellowish bands on the abdomen, under wing-coverts, and lower tail-coverts. The tongue is a surprisingly slender and worm-like organ. This species is not so gregarious as many of the others, being observed singly or in twos or threes, and frequenting the dense forests, where it keeps mostly to the tops of the loftiest trees. Its flight is described as slow and noiseless and not extended for any great distance. Mr. Macgillivray ventured the opinion that the powerful beak was employed in stripping away the leaves near the summits of palm trees to enable it to arrive at the tender central shoot, but Mr. Alfred Russel Wallace found them feeding almost exclusively on the kernel of the kanari-nut, the fruit of a lofty forest tree (*Canarium commune*) growing in the Moluccas and elsewhere. This nut, which is triangular in shape and very smooth, has such an exceedingly hard shell that it requires a heavy hammer to crack it, yet

the bird succeeds in opening it very dexterously. "Taking one endwise in its bill, and keeping it firm by a pressure of the tongue, it cuts a transverse notch by a lateral sawing motion of the sharp-edged lower mandible. This done it takes hold of the nut with its foot, and, biting off a piece of leaf, retains it in the deep notch of the upper mandible, and, again, seizing the nut, which is prevented from slipping by the elastic tissue of the leaf, fixes the edge of the lower mandible in the notch, and by a powerful nip breaks off a piece of the shell. Again taking the nut in its claws, it inserts the long and very slender point of the bill, and picks out the kernel, which is seized hold of, morsel by morsel, by the extensile tongue."

Raven Cockatoos. — Standing next to this, but distinguished at once by having feathered cheeks, is a group (*Calyptorhynchus*) of seven exclusively Australian species that may be known collectively as the Raven Cockatoos on account of their brownish and blackish coloration. In all the tail is rather long, with the outer tail-feathers shorter than the others, and crossed by a broad transverse band of lighter color. The members of this genus, according to Gould, are strictly arboreal and are evidently adapted to live upon the seeds of the *Eucalypti*, the honeysuckle trees (*Banksia*), and other trees peculiar to the country they inhabit; but they diversify their food by occasionally devouring large caterpillars. They can scarcely be considered gregarious, but move about in small companies. Their flight is rather powerful, but at the same time labored and heavy; and their voice is a low crying call totally different from the harsh screaming notes of the typical Cockatoos. Although all are objects of more or less interest, we have space for brief mention of but one, and this may well be the Banksian Cockatoo (*C. banksi*) of East and South Australia. The male has the entire plumage glossy greenish black, with a broad band of deep rich vermilion across the middle of all but the two central tail-feathers, while the female is similar, but has the head, sides of the neck, and wing-coverts pale yellow and the lower surface is narrowly barred with the same; the length is twenty-four inches. They are suspicious, shy birds, difficult of approach, and usually seen singly or in small flocks feeding among the honeysuckle and eucalyptus trees; their note is a loud, hoarse call. Their two or three eggs are placed in holes usually very high up in the eucalyptus trees.

Helmeted Cockatoo. — Closely allied to the last is the handsome Helmeted or Ganga Cockatoo (*Callocephalon galeatum*) of southeastern Australia and Tasmania, which is the sole tenant of its genus. About thirteen and a half inches long, the male is slate-gray, with the top of the head, crest, and cheeks a fine scarlet, while the female is similar, but has the crest gray and shows traces of sulphur-yellow on the lower surface. It is a shy species, feeding on the seeds of the gum and other trees.

Typical Cockatoos. — This brings us to the typical Cockatoos (*Cacatua*), of which there are no less than seventeen species recognized, ranging practically throughout the region covered by the subfamily. As already hinted, these are the most gorgeously plumaged members of the group and the ones most frequently kept in captivity, and in all but one the color is white, often tinged with rosy or

sulphur-yellow. Following the disposition of Count Salvadori, it is possible to separate the genus into two well-marked divisions on characters afforded by the crest. In the first of these two divisions, which includes half a dozen splendid species, the feathers of the crest are narrow, each terminating in a slender point which is recurved at the extremity. The largest of these is the Great Sulphur-crested Cockatoo (*C. galerita*) of Australia and Tasmania, which attains a length of eighteen or twenty inches, and has the entire plumage white, with the exception of the elongated crest, which is sulphur-yellow. Closely related but not exceeding a length of eighteen inches and having the naked skin about the eyes blue instead of white, is the Papuan Sulphur-crested Cockatoo (*C. triton*) of the Papuan Islands, while the Lesser Sulphur-crested Cockatoo (*C. parvula*) of the Lesser Sunda Islands is only twelve and a half inches long and has a rather brighter yellow patch on the ears. Of about the same size and coloration as the last but with all the feathers having a distinctly yellow tinge is *Cacatua sulphurea* of Celebes and the Togian Islands, but distinguished at once by the orange-yellow crest is the Citron-crested Cockatoo (*C. citrinocristata*) of the Sumba Islands. In South Australia, as well as in some parts of the interior, occurs the splendid species known as Leadbeater's Cockatoo (*C. leadbeateri*), a bird about sixteen inches long, with the general plumage white, the forehead, front, and sides of the neck, breast, and abdomen tinged with rose-color, becoming very bright under the wings, while the crest is crimson at the base, yellow on the center, and white at the tip.

Fig. 148. Rose-crested Cockatoo, *Cacatua moluccensis*.

The remaining species belong to the second division, in which the crest is composed of feathers that are broadened and not recurved at the tip, one of the best-known examples being the fine White-crested Cockatoo (*C. alba*) of the Molucca Islands, which has the plumage white throughout; its length is eighteen inches. In the Bismarck Archipelago the place is taken by an allied form (*C. ophthalmica*), which is slightly larger and has the inner feathers of the crest yellow and the bare space about the eye blue instead of whitish, while still larger, attaining a length of twenty inches, is the Rose-crested Cockatoo (*C. moluccensis*) of Ceram and Amboyna, in which the entire plumage is rosy-white, with the inner long feathers of the crest edged with orange-vermilion. Australia is the home of two closely related species, of which we may mention the Blood-stained Cockatoo (*C. sanguinea*), which has the general plumage white, with the lores and sides of the face stained with patches of blood-red, and the bases of the wing and tail-feathers sulphur-yellow; it is about fourteen inches in length. The only other species that space will permit of mentioning is the beautiful Rose-breasted

Cockatoo (*C. roseicapilla*), which has the upper surface gray, deepening into brown on the extremities of the wings and tail, and becoming nearly white on the rump, while the crown is pale rosy-white and the entire lower surface a deep, rich, rosy-red.

Australian Cockatoo-Parakeet. — Passing over the Slender-billed Cockatoos (*Licmetis*), of which there are but two species, both Australian, and so named from the fact that the bill is long, slender, and has the hook of the upper mandible projecting forward, we come to the final member of the subfamily, namely, the Cockatoo-Parakeet or Cocktail (*Callopsittacus novæ hollandiæ*) of Australia, which is distinguished at once by possessing narrow and pointed instead of rounded tail-feathers, the middle pair being much the longer. This bird much resembles the so-called Grass Parakeets, and has often been placed among them, but according to Salvadori it has the anatomical characters of the present group. The plumage is dark gray, becoming lighter on the rump and lemon-yellow at the base of the crest, with the forehead and cheeks yellow, the ear-coverts reddish orange, and a large wing patch of white; the female is paler than the male; the total length is twelve and a half inches, of which slightly more than half is taken up by the tail. This is a migratory species, spending the nesting season in the southern districts and retiring at its close toward the tropical area. It has an even, easy, though not long protracted flight and goes about in flocks sometimes of very great size, it being, according to Gould, a not unusual circumstance to see hundreds together on the dead branches of the gum trees in the neighborhood of water. It nests in holes of gum and other trees, usually in the vicinity of water, and lays five or six or even more eggs. It makes a very engaging and intelligent pet.

The Typical Parrots (Subfamily *Psittacinæ*). — This, the largest and most important of the subfamilies, comprises approximately three times as many species as all the others combined, and is the only one represented in the New World. As might be supposed with such a vast concourse of forms, it is extremely difficult to define them by positive characters, but in general terms they may be separated from the Owl-Parrots by the complete sternum, from the Nestors, Lories, and False Lorikeets by the file-like surface of the under portion of the hook of the bill, and from the Cockatoos (with the exception of the genus *Nymphicus*) by the absence of a crest. They are capable of division into half a dozen or more fairly well marked groups, which have often been called subfamilies; but since the entire group is only accorded subfamily rank by Dr. Gadow, whom we are following, it is impossible to give them this designation. The first of these groups embraces only the Pygmy Parrots; the second includes the American Sharp-tailed Parrots; the third, the Amazons, or Blunt-tailed Parrots; the fourth, the Gray and Black Short-tailed Parrots; the fifth, the true Parakeets; and the sixth, the Broad-tailed Parrots.

The Pygmy Parrots. — When compared with the Great Black Cockatoo or the still larger Macaws, the quaint little Pygmy Parrots of the Papuan Islands seem well named indeed, for the smallest is only two and four fifths inches in length, and the very largest scarcely exceeds four inches. They are confined

in a single genus (*Nasiterna*) with a round dozen species, and are distinguished at once from their relatives by the very short, squared tail, the feathers having the shafts pointed and projecting beyond the webs, while the bill is shaped as in the Cockatoos, but with the cere in the form of a broad band, which, however, becomes narrower above. The wings are relatively long and pointed and when folded reach to or beyond the tip of the tail, and the toes are very long and thin. The sexes are unlike in coloration, the males being gorgeously decked in green, with more or less of yellow, red, and blue, while the females are similar but much duller plumaged.

The American Sharp-tailed Parrots. — For the first time, in considering the great assemblage of Parrots, have we come to the New World, which is really exceedingly rich in these birds. The present group is a large one, embracing sixteen genera and over one hundred species, and ranges from the southern borders of the United States to Patagonia, being most in evidence in Central America and northern South America. The most marked external character is the long and graduated tail, with the individual feathers tapering into a point and the middle pair always the longest. The bill is strong, almost always deeper than long, while the cere is naked or sometimes feathered. Green is the prevailing color of the plumage, though some species are mainly yellow or blue, and red is by no means absent. It embraces the splendid Macaws, as well as a host of smaller and less brilliant forms.

Macaws. — Brazil and adjacent Paraguay is the home of two genera and four species of large Macaws which are characterized by an incomplete orbital ring and a plumage which is blue throughout. The first of the genera (*Anodorhynchus*), separated largely on the ground of feathered lores, is best exemplified by the Hyacinthine Macaw (*A. hyacinthinus*) of the central provinces of Brazil. It is a splendid bird but little under three feet in length, the plumage being nearly uniform cobalt-blue, relieved by bright yellow skin about the eyes and at the base of the lower mandible, and the black, very powerful bill. This appears to be everywhere a rare species, occurring, according to Riker, about the inland ponds in the dense forests of the interior, where it feeds upon the fruit of a palm peculiar to these localities. Some of the palm fruits are so hard that it requires a sharp blow with a heavy hammer to break one, yet they are crushed to pulp by the powerful bills. Its nesting habits, as we are told by Azara, differ from those of most other Macaws in that they excavate a hole in the river bank for their nest instead of placing it in a hollow tree; the eggs are said to be two in number. In Spix's Macaw (*Cyanopsittacus spixi*) of the province of Bahia, Brazil, the lores are naked and the general color also blue, but parts of the head are more or less grayish; its length is but twenty-two inches.

In the true Macaws (*Ara*) so called, the bony orbital ring is complete, and the lores, and to a greater or less extent the cheeks, are naked. There are fifteen recognized species, which range from Mexico to South America as far as Bolivia and Paraguay, most of them being extremely brilliant in coloration, though the colors are often violently contrasted. Thus one of the handsomest and best-known is the Blue-and-yellow Macaw (*A. ararauna*), which enjoys an extensive

range in tropical America, from Panama to Bolivia and Guiana. A little over thirty inches in length, it has the upper parts blue, the forehead olive-green, and the ear-coverts, sides of neck, breast, and abdomen yellow orange, while the wings and tail are blue above and golden olive-yellow below. This species, and the next as well, is frequently seen in zoölogical gardens and menageries, where if properly cared for it may live for years. It is possessed of a fairly good temper and becomes much attached to its attendant, though it, and in fact all Macaws

Fig. 149. — Hyacinthine Macaw, *Anodorhynchus hyacinthinus*.

in captivity, often persists in violent screaming. Larger and even more gorgeously plumaged is the great Red-and-blue Macaw (*A. macao*), which is mainly scarlet-red both above and below, but with the back and upper and lower tail-coverts pale blue, as are the wing-quills, while the shoulders and greater coverts are chrome-yellow; the tail-feathers are scarlet, the two central ones scarcely tipped with blue, the blue tips increasing in extent on the outer feathers, the three outermost being almost wholly of this color. The home of this bird extends from Mexico, through Central America to Bolivia, Guiana, and the Amazon Valley, being in many localities a very common species and seen usually in pairs or companies of pairs. Another species of somewhat similar coloration is the

Red-and-green Macaw (*A. chloroptera*), which differs mainly in being of darker red or crimson and in having the middle wing-coverts olive-green instead of yellow; it has much the same range as the last except that it does not extend north of Panama. A majority of the species of the genus have the general color green, one of the best-known of this type being the Green Macaw (*A. militaris*), which is green throughout except for the presence of a scarlet patch on the forehead and blue on back, rump, wings, and tail. It is smaller than those already mentioned, attaining a length of but twenty-seven inches, and is one of the most northern in distribution, ranging from Mexico to Peru and Bolivia. Although this and several of the others are fairly well known in captivity, but little appears to have been recorded of them in a state of nature, and we are fortunate in having a full account of this species by Colonel Grayson, from whom we quote. This magnificent species, he tells us, is fairly common in many portions of western Mexico, being found only in the belt of land which lies between the seacoast and the Cordilleras, though often extending to a height of three or four thousand feet on the mountains. Here it migrates from one locality to another in quest of food suited to its taste, but never crossing the principal chain to the eastward. "The Guacamayo is so called by the natives from the fact that it never descends to the ground but once during the year, and this is in the month of May. They alight upon the ground at this season of the year in search of a certain kind of hard nut, of which they are very fond, and no longer find in the trees which bear it. The tree of this nut the Mexicans call 'Ava,' a species of Nux Vomica; both the milky sap of the tree as well as the fruit are deadly poison to any other animal but this Parrot. . . . The pod that contains the fruit is spherical, and about twelve inches in circumference, divided into sixteen sections, in each of which is the button-shaped kernel. The shell is exceedingly hard, but the enormous bill and powerful jaws of the Guacamayo enables it to split each one of the sections with apparent ease. It also feeds upon the small cocoanut or nuts of the royal palm, which are also very hard, but not proof against the strong bill of this Parrot. It feeds to some extent on various species of Acacia beans, together with other kinds of wild fruit, and corn-fields are sometimes visited by it. The Guacamayo is gregarious, except during the breeding season, and continues in pairs throughout the year. When migrating to some distance they pass at a great height, flying in pairs, uttering their discordant and harsh cries. They congregate for many miles around to some chosen spot to roost, which they continue to visit for many months, roosting upon the topmost branches of the tallest trees. They breed in holes of trees, usually in the wild fig, which is the largest tree of these forests, depositing their eggs upon the bare wood; the eggs are white, two in number, and a little less than those of the common hen; their breeding season commences in April, and both male and female perform the duties of incubation."

Conures. — Perhaps most closely related to the Macaws, but approximating only a foot in length and having the lores feathered, are the Conures (*Conurus*), which are so named from the cuneate or wedge-shaped form of the tail. The prevailing colors of plumage among them are green, yellow, and orange, occa-

sionally with blue in the wings and red on head or breast. The thirty or more species are widely spread from Mexico through Central America and the West Indies to South America as far as Bolivia and Paraguay. Without going extensively into their delimitation, it may be stated that in general they are sociable birds, going about in noisy flocks and being tame and unsuspicious when unmolested, but soon acquiring a distrust of man under persecution. Thus Richmond, in writing of Finsch's Conure (*C. finschi*) of Central America, says: "It feeds usually in large trees standing in the plantations, but at times in small trees bordering the forest, where one day I found a flock of about twenty-five scattered about in low trees that were loaded with berries. The birds were tame and allowed one to approach them very closely."

Carolina Parakeet. — Very closely related, and indeed included with the Conures by the American ornithologists, is the monotypic Carolina Parakeet (*Conuropsis carolinensis*), the only Parrot really indigenous in North America north of Mexico. This is a handsome little species about twelve and a half inches in length, with the head and neck all around yellow, the forehead, cheeks, bend of the wing and tibia orange, and the remainder of the plumage bright green. When this country was first settled the Parakeet was found to be common and quite generally distributed throughout most of the eastern United States, being most abundant in Florida and the Gulf States, but extending northward along the valleys of the Mississippi, Illinois, and Ohio rivers, reaching Maryland, the Great Lakes, Iowa, and Nebraska, and exceptionally Michigan and New York. But the unfortunate possession of a bright-colored plumage, coupled with a degree of destructiveness to fruit orchards, and gregarious habits which prompt them to attempt the succor of wounded companions, have conspired to so thin their ranks that they seem actually on the verge of extermination, being now restricted to a few localities in the middle portions of Florida, Arkansas, and the Indian Territory. Of their appearance in bygone days, we may quote from Nuttall, one of the most graceful of our early writers, who says: "The Carolina Parakeets in all their movements, which are uniformly gregarious, show a peculiar predilection for the alluvial, rich, and dark forests bordering the principal rivers and larger streams, in which the towering cypress and gigantic sycamore spread their vast summits over a wide waste of moving or stagnant waters. From these, the beech and the hackberry, they derive an important supply of food. The flocks moving in the manner of Wild Pigeons dart in swift and airy phalanx through the green boughs of the forest; screaming in a general concert, they wheel in wide and descending circles round the tall buttonwood, and all alight at the same instant, their green vesture, like the fairy mantle, rendering them nearly invisible beneath the shady branches, where they sit, perhaps arranging their plumage, and, shuffling side by side, seem to caress and scratch each other's heads with all the fondness and unvarying friendship of affectionate Doves. If the gun thin their ranks, they hover over the screaming wounded or dying, and returning and flying around the place where they miss their companions, in their sympathy seem to lose all idea of impending danger." A few years ago Mr. Chapman found one sad remnant, aggregating

perhaps fifty birds, near the head waters of the Sebastian River in eastern Florida, where their favorite food seemed to be the seeds of a large thistle, and Mr. Ridgway discovered a somewhat larger colony in southern Florida. The cockle-bur was formerly a favorite food, and it was their custom to feed in the early morning hours, after which they retired to hollow trees to spend the warmer part of the day, venturing forth again toward evening. They are said to roost at night in hollow trees, clinging side by side in an upright position to the sides of the cavity by means of bill and feet. The Carolina Parakeet makes an engaging though usually quiet and demure pet, acquiring an affection for its attendant, but not being apt at the imitation of human language. They breed, though rather irregularly, in captivity, laying sometimes four or five eggs; but of their nesting habits in a state of nature we are practically in ignorance. They are said to place the nest in a hollow tree and to deposit two eggs, but exact data on the subject are wanting.

Argentine Green Parakeet. — Passing over four or five small and a single large genus which agree with the Conures in having the orbital ring complete, we come to the final genera of the group in which this ring is incomplete, a good representative being the Common Green Parakeet (*Myopsittacus monachus*) of Argentina and near-by countries. In this genus the bill is rather swollen on the sides and the nostrils hidden by the feathers, which project forward from its base. About eleven inches long, this species has the general color green, with the top of the head, lores, cheeks, throat, and breast gray, the feathers with paler margins, while the under parts are yellowish green, the wings blackish with slight bluish edgings, and the bill reddish white. The Green Parakeet, Mr. Hudson tells us, is a well-known and resident species in Argentina, though much less common than formerly, being a lively, restless bird, shrill-voiced, and exceedingly vociferous, living and breeding in large communities. "The nests are suspended from the extremities of the branches to which they are firmly woven. New nests consist of only two chambers, the porch and the nest proper, and are inhabited by a single pair of birds. Successive nests are added, until some of them come to weigh a quarter of a ton, and contain material enough to fill a large cart. Thorny twigs, firmly interwoven, form the only material, and there is no lining in the breeding chamber, even in the breeding season. Some old forest trees have seven or eight of these huge structures suspended from the branches, while the ground underneath is covered with twigs and remains of fallen nests. The entrance is generally underneath, or if at the side is protected by an overhanging eave to prevent the intrusion of opossums. These entrances lead into the porch or outer chamber, and the latter communicates with the breeding chamber. The breeding chambers are not connected with each other, and each set is used by one pair of birds." The nests are repaired and frequented all the year round, but new nests are only added at the approach of spring. The breeding season begins about November 1, and as many as seven or eight eggs are laid, these being dull white and very thin shelled. In the neighborhood of Concepcion, Mr. Barrows found them abundant and familiar, being usually seen in flocks of twenty and upward, visiting grain-fields, gardens, etc., but some-

times it appears in flocks of tens of thousands, completely stripping the grain-fields. In autumn and summer they feed principally on the seeds of the thistle.

Closely allied to the above but distinguished by having the nostrils exposed and opening in a cere which is much swollen all round, is a genus of some seven little Parakeets (*Bolborhynchus*), which range from Mexico to northern Chile and Argentina.

Parrotlets, American Love Birds. — Very much smaller than these, indeed the smallest of this group, are the pretty little Parrotlets, or American Love Birds (*Psittacula*), only one of which exceeds five inches in length and this one by but half an inch. They have relatively rather short tails, a different plumage in the two sexes, and curiously enough no furcula. Mainly green and blue in coloration, they may be divided into three groups, according to the color of the rump in the males, this being in the first a more or less deep ultramarine-blue, in the second a turquoise-blue, and in the third an emerald-green. Of the fourteen species which range from western Mexico to Brazil and Bolivia, the Tres Marias Love Bird (*P. insularis*), or Catarina, as it is called by the Mexicans, is confined to the Tres Marias Islands, where Mr. Nelson says it is usually seen in flocks, from a few pairs up to thirty or forty individuals. In May when he observed them they were feeding on a small, sweet fig which was common on the lower slopes. "When feeding they keep up a constant chattering, which notifies one of their presence. When flying over the top of the forest they keep in compact flocks and move steadily forward with rapid wing-beats, suggesting a flock of Cedar Birds. They are very gentle, affectionate little creatures and quickly become attached to their owners."

Amazons, or Blunt-tailed Green Parrots. — Under this somewhat ponderous designation are aggregated some ten genera and nearly one hundred species of small or medium-sized, mainly green-plumaged Parrots, whose most marked characteristic is the possession of a short and broad, rather round or even square tail about half the length of the wing, a moderately strong bill, and a swollen, naked cere. The great majority of these birds are confined to the tropical parts of the New World, but curiously enough a single albeit a large genus of over twenty species is widely spread over Africa south of the Desert of Sahara. Of the American forms perhaps the most typical are the Amazons (*Amazona*), of which there are about forty-five species, ranging from northern Mexico through Central America and the West Indies to Bolivia and northern Argentina. They belong to a group of three genera in which there is no tufted oil-gland and the tail is short or of moderate length, in this particular genus the tail being moderate and rounded, while the under tail-coverts are always green in color. They are all essentially gregarious, forest-haunting birds, generally of a tame and confiding disposition, and making excellent and highly prized pets, especially if taken from the nest when young; they may be taught to utter words very distinctly, as well as to sing and whistle tunes. Humboldt mentions a venerable bird which he met with in South America and "which remained the sole possessor of a literally dead language, the whole tribe of Indians which spoke it having become extinct." They feed upon the

fruits of various fruit trees, especially palms, and at least in Mexico are said to commit great depredation in corn-fields when the corn is in the milk. Their eggs, apparently always two in number, are deposited in holes in the largest trees of the forest, both parents assisting in incubation and caring for the young for some time after they are able to fly. Thus the Red-fronted Parrot (*A. finschi*) of western Mexico, Colonel Grayson tells us, is especially gregarious, often assembling in large flocks. "The forests in some localities, particularly when some kinds of fruit are in season, appear at times to be alive with them, only in the mornings and evenings, however, when they are seeking for their favorite food; they are then flying hither and thither through the woods, or perching and climbing among the branches that contain the fruit they are in search of, keeping up at the same time an incessant din of chattering." The Double Yellow-headed Parrot (*A. oratrix*) of Mexico to Honduras was found by Mr. Nelson to be so tame on the Tres Marias Islands that it could often be secured by quietly slipping over its head a noose attached to a long pole. The subject of our colored plate is the Hawk-Parrot (*Deroptyus accipitrinus*) of Guiana, Amazonia and Ecuador.

African Parrots. — As the other American representatives of this group offer nothing of particular interest, being but little known in a wild state, we may pass to a brief consideration of the African genus (*Poiocephalus*). These are rather small birds, mostly considerably under twelve inches in length, having a very deep bill with the lower mandible much deeper than long, and are divided into two groups, in one of which the general color is green and in the other brown. To the latter belongs Rüppell's Parrot (*P. rueppelli*) of Benguela and Damara Land, in which the general color both above and below is smoky brown, with the sides of the head grayish and the bend of the wings and under wing-coverts yellow; the length is about eight and a half inches. Mr. Andersson states that in Damara Land this species is common, being "always met with in small flocks of about half a dozen individuals, and seems to prefer the larger kinds of trees. It is rather shy, and when quietly perched amongst the branches is very difficult to perceive, until its presence is betrayed by the cries it utters as soon as it conceives itself to be in danger. It is rarely found far from water, which it usually frequents twice a day. It feeds on seeds and berries, sometimes also on the young shoots of trees and plants."

The next group, comprising the **Gray and Black Short-tailed Parrots**, is a small one, embracing only three genera and nine or ten species, all but one of which are natives of Africa or Madagascar, the exception being a resident of New Guinea. They are much larger than those just considered, ranging from twelve to twenty inches in length, and may be known by the prevailing gray or black color of the plumage, with or without a minor element of red. The cere is broad and surrounds the base of the upper mandible, but is narrower below the nostrils, and the latter are not surrounded by a swelling of the cere. The sides of the head are more or less naked, the wings moderately long, and the tail square or rounded and about half the length of the wing. In the African genus *Psittacus* the sides of the head for the greater portion are naked and covered

HAWK-PARROT
(*Deroptyus accipitrinus*)

with papillæ. The best-known member of the genus, and for that matter perhaps of the entire suborder, is the **Common Gray Parrot** (*P. erithacus*), which ranges from Senegambia to equatorial Africa in a wild state, but which has been known in Europe and other parts of the world for hundreds of years as a cage bird. While perhaps too familiar to need description, the Gray Parrot may be briefly described as ash-colored, becoming much lighter on rump and abdomen, while the primaries are blackish, with a gray tinge toward the base, and the tail, with its upper and under coverts, red; the total length is about thirteen inches. This bird is probably the most accomplished talker of the whole group of Parrots, and, did space permit, a whole chapter might be filled with circumstantial accounts of its accomplishments. "Contrary to what prevails among higher bipeds, the male is commonly the more valuable and fluent speaker of the two, although the female pronounces her words more distinctly." Curiously enough, neither of the other species in this genus is known to be talkative, so this attainment is purely individual, which does not seem to be the case with the American Amazons. The Gray Parrot, and in fact all the Parrots, are very long-lived, there being authentic accounts of their living from fifty to eighty years. In a wild state this species is more or less sociable, feeding and even breeding in small companies.

The **Vasa Parrots** (*Coracopsis*) to the number of five species are confined to Madagascar and neighboring islands, while the Black Parrot (*Dasyptilus pesqueti*), the sole representative of its genus, is found only in New Guinea. The first, which attains a length of about twenty inches, has the plumage blackish or brownish, while the latter is black throughout except for the abdomen, sides, upper and under tail-coverts, as well as large portions of the wings, which are red. But little is known of their habits in a wild state.

We come now to the **True Parakeets**, a large, exclusively Old World group of some fifteen genera and one hundred and twenty-five species. The exact definition of this group is difficult, at least from purely external characters, yet in general they may be known by a moderate or very strong bill which is deeper than long and usually red in color, at least in the males, while the cere extends as a band of equal width around the whole base of the bill and is generally partly feathered. The tail is variable, being sometimes very long and graduated, sometimes short and square or wedge-shaped; the sexes are mostly different. As an example of the striking differences in this latter particular, mention may be made of the Eclectus Parrots (*Eclectus*) of the Molucca and Papuan islands, in which the males are green and the females mostly bright red, the contrast being so great between them as to make it difficult of credence that they can belong to the same species.

True Parakeets. — Passing over several genera of the Oriental region, in which this sexual difference is marked to a greater or less degree, but of which little is known in a wild state, we come to the true Parakeets (*Palæornis*), which are distinguished at once by a very long, graduated tail, the feathers of which, but especially the two central ones, are very narrow. They comprise a very large genus of twenty-five species, and range from Africa north of the equator

through the Seychelles and Mauritius to India, Ceylon, and Cochin China, and thence through the Malay Peninsula to the large islands adjacent. The plumage is in general green, relieved in many species by a collar of rose-color, though the species are divided into two groups on the color of the head, this in one being entirely green, and in the other only partially or not at all of this hue. The commonest and best-known Indian species is the Rose-ringed Parakeet (*P. torquata*), the male of which attains a total length of sixteen or seventeen inches, of which the tail takes up about ten inches. The general color is green both above and below, the back part of the head with a tinge of blue, and the breast tinged with gray, while, as the name implies, there is a collar of rose about the neck except in front, and black stripes down and across the throat; the central tail-feathers are bluish and the others green and yellow. This species, Mr. Blanford tells us, abounds about towns and villages in most parts of the country, keeping mostly to the open and cultivated land. "It is often seen perched on houses and buildings of various kinds, such as temples or structures about fields and does much damage by pilfering grain and fruit. It occurs in large flocks at times, and often collects in great numbers toward sunset and perches for the night on trees near towns and villages, with Crows and Mynas, though sometimes they perch on bamboos. The cry of this Parrot, often uttered during the bird's swift arrowy flight, is shrill and rather harsh." The breeding season extends from January to May, the three or sometimes four eggs being placed in a hollow tree with little or no nest. These birds are easily domesticated, becoming attached and familiar, and are usually to be seen in most native and European houses. The other species, such for instance as the Blossom-headed Parakeet (*P. cyanocephala*), are in general more forest-haunting in their habits, and this particular one is said to have a softer and more musical cry. Another interesting species is the Bearded Parakeet (*P. modesta*) of the Indian Archipelago.

Love Birds. — Those who have visited aviaries are doubtless familiar with the pretty little Love Birds (*Agapornis*), which are so called from the affection the sexes seem to show for each other, as they sit closely side by side with heads and oftener bills in contact, each apparently the object of the other's loving solicitude, though, if the truth must be told, there appears to be among them an occasional Xanthippe, whose unfeathered prototype history tells us made life miserable for Socrates. Such an unamiable "Love Bird," Mr. W. T. Greene, the great authority on the Parrots, has told us about. The Love Birds, of which nine species are now recognized, are natives of the Ethiopian region, though a single one has been introduced into Reunion and other islands. They are among the most diminutive members of the entire group, none exceeding six and a half inches in length and several falling half an inch or more below this. In addition to their small size they are distinguished by a thick, deep bill, which is without a ridge or keel along the middle of the symphysis of the lower mandible, and by an extremely short tail, which is ornamented by a substantial band of black. One of the best-known species is the handsome little Rosy-faced Love Bird (*A. roseicollis*) of Southwest Africa, in which the general color is pale green,

though the forehead and eyebrows are red, the face and neck rosy, the rump and upper tail-coverts azure-blue, and the tail scarlet, tipped with green, in addition to the subterminal black band; the female is similar to the male. Of their habits as observed in Damara and Great Namaqua Land, Mr. Andersson writes as follows: "It is always observed in small flocks, and seldom far from water, to which it resorts at least once in a day. This species is very swift of flight, and the little flocks in which it is observed seem to flash upon the sight as they change their feeding grounds or pass to or from their watering places; their flight, however, is only for a comparatively short distance at a time. They utter rapid and shrill notes when on the wing, or when suddenly disturbed or alarmed. Their food consists of berries or large berry like seeds. This bird does not make any nest of its own, but takes possession of nests belonging to other birds, though I cannot say whether it forcibly ejects the rightful owners of these nests, or merely occupies such as they have abandoned; but I have seen the Parrots and the Grosbeaks incubating in about equal numbers under the shelter of the same family roof." The eggs are pure white.

Bat-Parrots. — Perhaps closest of kin to the last, and forming the final members of this great group, are the curious little Hanging or Bat Parrots, or Lorikeets (*Loriculus*), the couple of dozen species of which range from India and the Philippine Islands through the Malay Archipelago as far east as the Duke of York Island in the Bismarck Archipelago. They are quaint, pretty little birds, all under six and a half inches in length, or much smaller though of course much more bulky than many Hummingbirds, which seems quite anomalous for a Parrot. Structurally they are distinguished from all other members of the group by the bill, which is thin and longer than deep, the upper mandible especially being long and very little curved. They are brilliant in plumage, the prevailing color being green, relieved often by dashes of scarlet, blue, and yellow, and in all the under surface of the wings and tail is verditer-blue. They take their name of Hanging Parrots from their habit of suspending themselves by the feet from a branch, in which position they habitually sleep, and even during the day, when several may sometimes be seen in this position side by side, caressing and feeding each other. As the shape of the bill indicates, these Parrots are largely flower-suckers, subsisting on honey and plant juices, but also buds and tender shoots. The Indian Lorikeet (*L. vernalis*) is green, this being paler beneath and brighter on the head, with a tinge of orange between the shoulders, while the rump and upper tail-coverts are red, the throat bluish, and the upper breast tinged with yellowish. The bill is dull coral-red, the cere red, and the legs pale orange; the total length is five and a half inches. The female is similar but less brilliant green, with more of a yellowish tinge, and lacks the bluish on the throat. They are found chiefly in clearings amongst forest trees, and in gardens and groves of fruit trees, feeding on fruit and flower buds, and are said to be specially fond of the juice of the cocoanut palm. It is frequently kept as a cage bird, but is rather hard to care for properly on account of the difficulty of securing food. This species nests in holes in trees, laying from three to five eggs.

The Broad-tailed Parrots. — The final group of this subfamily comprises

about a dozen genera and fifty species of medium-sized or large Parrots, which are most abundant in Australia, whence they range through New Zealand, New Caledonia, and the Society Islands. They take their general name of Broad-tails from the fact that the tail is rather long and relatively broad, though often graduated. They have a short and thick bill, which is deeper than long, the upper mandible being swollen on the sides, while the cere is small, surrounding only the nostrils, and making a kind of saddle between them. The plumage is usually much variegated.

The first genus to be considered comprises the true Broad-tails (*Platycercus*), which take their vernacular name from the fact that the feathers of the tail are rather broad and never acuminate at the tips. They are further known by having the bill distinctly notched and the plumage of the back not uniform, the feathers being black, broadly margined, and having thus a scale-like appearance. The sixteen species now recognized in this genus are all confined to Australia and Tasmania, one of the best-known being the Rosella or Rose-hill Parakeet (*P. eximius*), which takes this name from having been first found at Rose-hill, near Sydney, this name having been later corrupted into Rosella. It is also known as "Pretty Joey," possibly, as Mr. Campbell suggests, because, like Joseph of old, it wears a coat of many colors, and it is not an inappropriate name, for it is really one of the handsomest of the Australian members of the suborder. About thirteen and a half inches long, the head, sides of the neck, breast, and under tail-coverts are scarlet, the cheeks white, the nape yellow, while the rump, upper tail-coverts, and lower parts of the abdomen are yellowish green, and the lower breast yellow with a band of scarlet along the middle; the wings are largely deep blue, the two central tail-feathers green, and the others largely dark blue, tipped with white. This splendid bird is one of the commonest and most familiar species of southeastern Australia and Tasmania, though somewhat local in distribution, a river of moderate width often forming a barrier over which it rarely passes. Mr. Gould tells us that it resorts to the open parts of the country, such as undulating grassy hills and plains bordered and studded here and there with large trees or belts of low acacias or banksias, among the branches of which it may be seen in small parties, the rich scarlet and yellow of its breast vying with the lovely blossoms of the trees. It has a habit of resorting to the public roads, and upon being disturbed by the passers-by will merely fly off to the nearest tree or to the rails of the wayside fence. Its flight is short and undulating, and is rarely extended to a greater distance than a quarter of a mile, often alighting to rest on a leafless branch. Its note is described as a pleasing whistling sound which is very frequently uttered. It feeds largely on seeds, particularly those of different grasses, and occasionally on insects and caterpillars. The eggs, from six to ten in number, are deposited in a hollow limb or trunk of a tree, often at no great distance from the ground. It is quite highly prized as a cage bird, often breeding in confinement, and, as is common among Parrots, frequently lives to a good old age.

Crimson Parakeet. — Of the same size as the last, but even more brilliant, is the Crimson or Pennant's Parakeet (*P. elegans*) of East and South Australia,

the adult male of which is largely a deep, rich crimson, set off on cheeks and shoulders with cerulean blue. It frequents grassy hills and brushes as well as open glades in the forest, and, says Mr. Campbell, "when a flock is seen passing through the forest they describe, as it were, so many streaks of the richest crimson coloring." The nesting habits are similar to those of other species.

Introducing a group of half a dozen genera, in which the back is uniform, is the Red-capped Parakeet, or King Parrot (*Porphyrocephalus spurius*), of West Australia, which is the sole tenant of its genus. It is a very handsome bird about fifteen inches long, with the forehead, crown, and nape deep maroon-red, the cheeks yellowish green, the rump jonquil-yellow, and the edges of the shoulders and the bases of the primaries deep blue, while the wings are deep black and the breast and abdomen blue, with vent and under tail coverts scarlet. This species is usually seen in small families feeding on the ground, though the nature of its food is not well understood, yet Campbell states that it loves to feed upon the kernel of the native pear. Its voice is a sharp clucking note several times repeated, and its nest is located in a hollow tree.

Grass Parakeets. — Belonging to the same family group, but much better known, are the pretty little Grass Parakeets (*Neophema*), the seven species of which are also confined to Australia and Tasmania. The bill is uniform in color, deeper than long, and not notched, while the four central tail-feathers are of about the same length, a character which separates them from a closely allied genus. The Grass Parakeets are largely terrestrial in their habits, spending much time amongst tangled grasses and reeds, through which they run with celerity, and on the seeds of which they largely subsist. Probably the most abundant and best-known is the Elegant Grass Parakeet (*N. elegans*) of South and West Australia, where Mr. Gould says it appears to prefer the barren and sandy belts bordering the coast, but occasionally resorts to the more distant interior. "Flocks were constantly rising before me while traversing the salt marshes; they were feeding upon the seeds of grasses and various other plants which were there abundant; in the middle of the day, or when disturbed, they retreated to the thick banksias that grew on sandy ridges in the immediate neighborhood, and in such numbers that I have seen the trees literally covered with them." Mr. Gilbert also speaks of finding them in myriads about several pools, there being no other water for many miles around. This species is about nine inches long and has a bar of deep indigo-blue across the forehead, while the lores are rich yellow, the head, cheeks, back, and shoulders greenish blue, the secondaries blue and the primaries black, and the under parts greenish yellow becoming bright yellow on the abdomen. Another member of the genus is known as the Rock Parakeet (*N. petrophila*), being confined to the rocky islets of the coast of Southwest Australia, where it places its four or five eggs in a crevice of a rock or under shelving stones. It is distinguished from the other members by having the lores and a circle surrounding the eyes of a pale verditer-blue instead of yellow or greenish yellow.

Crested Parakeets. — Still within the limits of the half a dozen genera above mentioned is the genus *Nymphicus*, which is distinguished by the presence

of a well-defined crest, a feature which is unique within the group of Parakeets. The two known species are confined to New Caledonia and the Loyalty Islands, the one from the first-mentioned locality (*N. cornutus*) having a crest of only two feathers which are black, tipped with red, in addition to which there is a yellow collar, red forehead, and black face; the length is fourteen inches. In the Uvæan species (*N. uvæensis*) of the last-mentioned locality, the crest consists of six feathers which curve forward at the tips, the color being dark green, while there is no nuchal collar, and the face is dark green. With a brief account of the two genera in which the tail is crossed from base to tip by alternate light and dark bands, we may close our notice of this interesting group. The first of these (*Pezoporus*) is further distinguished by having the tail long, much longer in fact than the wing, and nails long and slender, its best-known member being the Common Ground Parakeet (*P. terrestris*) of South and West Australia and Tasmania. It is about twelve and a half inches long, of which the tail takes up nearly eight inches, the general color being green, with the forehead crossed by a band of dark orange, and the remainder of the upper parts crossed feather by feather by irregular bands of black and yellow, while the breast, abdomen, and under tail-coverts are greenish yellow with numerous blackish bands; the four central tail-feathers are green, with narrow bands of yellow. The Ground Parakeet is a very peculiar bird, being entirely terrestrial in its habits, and seemingly having lost the power of perching on trees or bushes. According to Gould: "It usually frequents either sandy sterile districts covered with tufts of rank grass and herbage, or low, swampy flats abounding with rushes and other kinds of vegetation peculiar to such situations. From its very recluse habits and great powers of running it is seldom or never seen until it is flushed and then only for a short time, as it soon pitches again and runs off to a place of seclusion. On the approach of danger it crouches on the earth or runs stealthily through the grasses. It flies with great rapidity, frequently making several zigzag turns in the short distance of a hundred yards, which it seldom exceeds without again pitching to the ground. Its flesh is excellent, being delicate in flavor and equaling, if not surpassing, that of the Quail or Snipe. Its four or five white eggs are deposited on the bare ground," usually under a dense tuft of grass. In many places where this species was formerly abundant it has now entirely disappeared, owing to the fact that the morasses have been reclaimed and the drier open land broken up by cultivation.

Night Parakeet. — Inhabiting much the same portions of Australia is the remarkable little monotypic Night Parakeet (*Geopsittacus occidentalis*), which is peculiarly interesting from the fact that it is the only Australian member of its group having nocturnal habits, and moreover it is almost the only one which attempts to build a nest. Although it was first brought to scientific attention by Gould, this great naturalist was unable to record anything regarding its habits, but it has since been learned that it is mainly a ground bird. In an interesting account the late Mr. F. W. Andrews says: "During the day this bird lies concealed in the inside of a tussock or bunch of porcupine grass, the inside being pulled out and a snug retreat formed for its protection. Here, also, its rough

nest is formed and four white eggs laid. When the dark shades of evening have fairly set in, it comes out to feed, but generally flies direct to the nearest water, which is often a considerable distance from its nest; in some instances I have known them to fly a distance of four or five miles. After drinking and shaking themselves up a little, they fly off to feed on the seeds of the porcupine grass, returning to water two or three times during the night." In color this species is olive-green above, many of the feathers with a black middle, others with a spot of yellow, while the cheeks and sides of the neck are provided with small black spots, and the lower parts are sulphur-yellow, with black bands on the sides; the length is between nine and ten inches.

CHAPTER XXV

THE ROLLER-LIKE BIRDS

(Order *Coraciiformes*)

THE Roller-like birds constitute a very large and much diversified order of birds most closely related to the Cuckoo-like birds (*Cuculiformes*) on the one hand, and to the Sparrow-like birds (*Passeriformes*) on the other. They are mainly of arboreal habits and have the young born blind and helpless, are as a group strictly cosmopolitan in distribution, and in a majority of cases nest in holes and lay white eggs. Without going extensively into the structural characters, it may be stated that they have comparatively short legs, generally the bridge (desmognathous) form of palate, and the slit-like (holorhinal) form of nostrils, while the ambiens muscle is always absent, and the basipterygoid processes at the base of the skull either absent or rudimentary. The cervical vertebræ are thirteen, fourteen, or fifteen in number.

The *Coraciiformes* contains seven suborders; the *Coraciæ*, *Striges*, *Caprimulgi*, *Cypseli*, *Colii*, *Trogones*, and *Pici*, and a large number of families and subfamilies. The characters of each group will be set forth under the respective headings.

THE ROLLERS AND THEIR ALLIES

(Suborder *Coraciæ*)

The present group is divided into five families, including the Rollers proper (*Coraciidæ*), the Motmots and Todies (*Momotidæ*), the Kingfishers (*Alcedinidæ*), the Bee-eaters (*Meropidæ*), the Hornbills (*Bucerotidæ*), and Hoopoes (*Upupidæ*).

THE ROLLERS

(Family *Coraciidæ*)

This is a small, exclusively Old World group of often brilliantly colored birds, showing points of affinity with the Motmots and Kingfishers, especially agreeing with the latter in the greater or less union of the toes. They are of moderate size, few exceeding twelve or fourteen inches in length, and have ten primary quills and twelve tail-feathers, while structurally they are dis-

tinguished by having the oil-gland nude, the bridge (desmognathous) form of palate, and functional cæca, the latter sometimes two inches long. They are comprised in two well-marked subfamilies, — the *Leptosomatinæ* and the *Coraciinæ*, or true Rollers.

Kirombos, or Cuckoo-Rollers. — The first-mentioned subfamily embraces only a single genus (*Leptosomus*) and two closely allied species, one of which inhabits Madagascar and the other the adjacent island of Great Comoro. They have a moderately long, slightly curved and hooked bill, and narrow exposed nostrils which open in the middle of the upper mandible and are covered by a horny plate, while the loral plumes are recurved and directed forward, hiding the base of the bill. The legs are rather short and stout, with the outer toe cleft to the base and partly reversible, and the inner toe united to the middle one along the basal joint. As showing a possible affinity with the Frogmouths (*Podargidæ*), they have a powder-down patch on each side of the rump, a feature not present in any other member of the family. Unlike the true Rollers, the sexes are dissimilar in coloration, the male showing a metallic tinge on the dorsal plumage. They are mainly arboreal in habit, frequenting the outskirts of the forests and bush-covered plains, enjoying a strong, tolerably swift flight, and, like the other members of the family, they frequently execute various aërial evolutions on the wing. They feed on insects and small reptiles. The principal species, usually known by the native name of Kirombo or Vorondreo, but also called the Cuckoo-Roller (*L. discolor*), is found in Madagascar and several near-by islands. It is about sixteen inches long, the male being dark ashy gray on the head and neck, excepting the crown, which is dull blackish plumbeous glossed with metallic green, while the remainder of the upper parts are a dark iridescent green tinged with copper-red, and the lower parts dark ashy gray becoming pure white on the under tail-coverts; the wings and tail are blackish, glossed with steel-green and copper-red, respectively. The slightly larger female is very different, being rufous-brown above barred with black, excepting the crown, which is black, while the back is brown, glossed with green and spotted with reddish brown, and the under parts are rufous-buff, spotted with greenish black; the wings are blackish gray and the tail entirely brown, becoming blackish toward the end. The young birds resemble the females, but are duller in color.

The Kirombos are rather tame birds, living mostly in small family parties of ten or a dozen individuals, the males always being more numerous than the females. The following account of their habits is from Grandidier: "They frequently fly during the day at great altitudes, soaring like birds of prey in circles above the treetops. But during the pairing season they exhibit the greatest excitement — when they rise from time to time obliquely into the air with violent flaps of their wings, which they then half close and allow themselves to descend to the treetops, to again at once ascend, and thus they continue for some time, and then glide, uttering at intervals a mournful and plaintive cry, *drèo-drèo*, at the same time puffing out their throats and erecting the feathers on their heads." They are so sociable and devoted to each other that should one be wounded out of a flock the others will remain close by, hovering over the disabled

bird or perching on near-by trees. Their nests are said to be placed in holes in trees, or occasionally under overhanging banks; the eggs are pure white.

Fig. 150. — Kirombo, or Cuckoo-Roller, *Leptosomus discolor*.

The Comoran Kirombo (*L. gracilis*) is similar to the other species except that it is smaller and the female somewhat paler in general coloration. Little is known regarding its habits, although they probably resemble those of its larger relative.

Rollers. — The members of the second subfamily (*Coraciinæ*), to the number of five or six genera and thirty or more species, are quite widely dispersed over the temperate and tropical portions of the Old World, being most abundant in the Ethiopian region. Many of them are very brilliant in plumage with combinations of blue, green, and reddish, and they take the common name of Rollers from the peculiar evolutions they execute while on the wing. They possess a strong, almost Crow-like bill, with the narrow nostrils placed near the base of the upper mandible and nearly hidden by bristly feathers, but, unlike those last considered, they are without the powder-down patches on the rump; the sexes are alike in coloration.

Pitta-Rollers. — Madagascar is the home of a group of four genera (*Brachypteracias*, *Atelornis*, *Coracopitta*, and *Uratelornis*) and five species of ground-haunting forms known as Pitta-Rollers, distinguished by the elongated and stout tarsus and mainly terrestrial habits. They frequent the dense forests and are not often seen on the wing, keeping mostly to the ground or perching on low trees, and by some observers they are said to be more or less crepuscular. They feed on insects, small reptiles, etc., which they seek by scratching among the moss and dead leaves after the manner of gallinaceous birds. Not much is definitely known regarding their nidification, but they appear to deposit their white eggs in holes in trees or banks. It is believed by the natives that some of the species hibernate.

True Rollers. — The typical and largest genus of true Rollers (*Coracias*) comprises some sixteen species of splendid birds, spread mainly over Africa, but extending also through central and southern Europe, Asia Minor, the Indian peninsula, and the Burmese countries to Celebes. They have a long, rather compressed bill with a wide gape, rather long, broad wings, and a relatively short tarsus. They are shy, wild birds, distinctly arboreal in their habits, frequenting woods, groves, gardens, and occasionally inhabited places, and are strong and swift in flight. They feed largely on insects, most of which they capture on the wing, occasionally, however, descending to the ground for them. Their nests are made in hollow trees, overhanging banks, old ruins, or sometimes in inhabited houses, and their eggs are pure white and glossy. There is a group of small species in which the outer tail-feathers are greatly elongated, and sometimes with racket-shaped tips. One of the long-tailed species is the Abyssinian Roller (*C. abyssinicus*), a bird about seventeen inches in length which inhabits Abyssinia and the Soudan. The crown, nape, sides of the head, throat, and under parts generally are a greenish turquoise-blue, darker on the crown and paler on the abdomen; the back and shoulders are reddish cinnamon, while the rump and upper tail-coverts are a rich ultramarine-blue, as are the smaller wing-coverts, the other coverts and quills being greenish blue and ultramarine-blue, respectively; the outer tail-feathers extend for six inches beyond the others. South of the equator the Long-tailed Roller (*C. caudatus*) takes the place of the other, while the Racket-tailed Roller (*C. spatulatus*) inhabits East and Southeast Africa.

Common Roller. — Perhaps the best-known species of the genus is the

so-called Common Roller (*C. garrulus*), the bird inhabiting southern Europe, whence it migrates in winter to northern Africa, and is also found eastward through central Asia, retiring to northern India in winter. It is in the main pale blue throughout, darker on the head and paler on the abdomen, while the back, scapulars, and innermost secondaries are cinnamon-brown, and the rump, upper tail-coverts, and smaller wing-coverts a rich, deep ultramarine-blue. The

Fig. 151. — Common Roller, *Coracias garrulus*.

total length is about twelve inches, the outer tail-feathers not being elongated beyond their fellows, or at least rarely so. This Roller is described as having restless and uneasy habits, and as frequenting thin woods, groves, and brush-covered places, often perching on the summit of a dead tree or a telegraph pole or wire. Its note, according to Dresser, may be described "as a deep harsh *racker-racker-racker-racker*, which is very quickly uttered when the birds are squabbling, and with it is mingled a harsh *rrah*. When sitting quiet the note is a harsh *rack*, and *rack-rack*, and also a plaintive high *hrah*, not unlike that which a young Jackdaw sometimes utters. In fine weather the male rises in the air

near where the female is incubating, uttering a single *rack*, *rack-kaak*, until he attains a considerable altitude, from whence he suddenly falls, always turning a somersault, and throwing himself here and there in the air, uttering quickly the notes *rah*, *rarah*, *rrha rra*, etc., which he always changes to the *rack* directly he begins to turn his somersault, and then returns to his seat on a dead branch." During the nesting season this bird appears to prefer open woods and groves in a sandy district, and places the nest in a hole in a tree, wall, bank, or under the eaves of a house. The eggs number four or five and are pure white. Of the species found in India we may mention the Indian Roller (*C. indicus*), which Mr. Blanford says is one of the typical Indian birds, familiar to all the inhabitants of the country. It is commonly found in cultivated tracts, on trees about villages, and in thin tree- and bush-jungle. According to Jerdon, "it generally takes its perch on the top or topmost branch of some tall tree, and, on spying an insect on the ground, which it can do at a very great distance, it flies direct to the spot, seizes it, and returns to its perch to swallow it. When seated it puffs out the feathers of its head and neck." It feeds on insects, such as grasshoppers, crickets, etc. Its nesting habits are similar to those of the other species.

Broad-billed Rollers. —The final genus to be considered embraces the Broad-billed Rollers (*Eurystomus*), which are distinguished by the very short, broad bill and long, rather pointed wings. They range over the whole of tropical Africa and Madagascar, as well as India, China, through the Burmese countries to Manchuria and south through the Malay Archipelago to Australia. The Indian Broad-billed Roller (*E. orientalis*) is one of the smaller members of the group measuring only about ten and a half inches. It is largely greenish blue, darker on the head, and having the quills and tail black. "It is a forest bird," says Blanford, "haunting high trees, and usually perching on a dead tree or branch, sometimes on a bamboo, whence it flies down to capture insects. It is somewhat crepuscular in its habits and is generally silent. It breeds in March and April, in holes in branches of trees, as a rule at considerable height from the ground, and lays on the bare wood usually three white eggs."

THE MOTMOTS AND TODIES

(Family *Momotidæ*)

The second family comprises a small group of interesting birds confined exclusively to the New World and closely allied to the Rollers and Kingfishers, but also suggesting in some respects the Bee-eaters. They are disposed in two subfamilies,—the *Momotinæ*, which range from southern Mexico through Central America to Paraguay, and the *Todinæ*, which are confined to the Greater Antilles.

The **Motmots** (Subfamily *Momotinæ*), which range in length from about six and a half to twenty inches, are rather handsome birds with much of green, blue, cinnamon, and black in their loose-webbed plumage, and in most of the forms the central tail-feathers are much longer than the others and

terminate in racket-shaped tips. Structurally they are distinguished by the bridge (desmognathous) form of palate, a breast-bone with four notches on the hinder margin which are converted into foramina, while the blind intestines (cæca) are entirely absent. The bill, which is Crow-like in appearance, is provided with more or less pronounced saw-like notches, the exact function of which is not well understood. In the elongated central tail-feathers the racket-shaped expansions are usually separated by a long naked space from the web of the basal portion of the feather. There has been much discussion as to the manner in which these curious "rackets" are produced, some claiming that the birds themselves nibble away the webs as soon as they begin to project beyond the others, thus leaving the shaft bare for an inch or more. They have been observed to do this in captivity, but on the other hand Dr. Stejneger has described and figured specimens belonging to the U. S. National Museum in which the central tail-feathers, not yet half grown, are shown to be perfectly racket-shaped. He also shows that the intermediate portion of the web appears to be cut off by a line of holes, and this part would be quite likely to be broken away by the serrated bills of the birds as they are preening these feathers. The other feathers of the tail, as may be observed on the under side, are much graduated, the outer pair being often hardly a third the length of the others.

The Motmots are said to be rather solitary birds, or "at most living in pairs among the gloomy forests, where they sit on the underwood nearly motionless, or only jerking their long tails," as they utter their ordinary cry of *hoo-hoo* or *hu-tu*, which is their native name in some districts. Their food is somewhat more varied than that of their close relatives the Todies, consisting of insects, reptiles, and fruits, while in captivity they become practically omnivorous. Their nests, so far as known, are placed in holes excavated in banks, usually along watercourses. The following description of the burrow of the common Mexican and Central American species (*Momotus lessoni*) is by Mr. G. K. Cherrie, who observed it in Costa Rica. "The entrance tunnel extends back horizontally sometimes for a distance of six feet. At about half its length there is a sharp bend upward for some six inches, then the course is again horizontal as far as the chamber occupied by the nest. The nest space is twelve or fourteen inches in diameter, being round, and about six inches high with level floor and ceiling. A few rather coarse dry twigs are strewn over the floor." The nest, if opened when the young are about to leave, is found to be an exceedingly dirty and foul-smelling place, with the remains of decaying and vermin-infested food scattered about. The eggs are described as white or cream-colored and glossy; the number is three or four.

The twenty-four or more species of Motmots are disposed among seven genera, in one of which, the monotypic *Urospatha*, the nostrils are oval and situated in front of the nasal depression, while in the remaining genera the nostrils are rounded and located in the front part of the nasal cavity. A further division of the genera is made on the basis of the relative length of the tail, this being in five genera much longer than the wing, while in the final genus (*Hylomanes*)

the wing and tail are about equal in length. One of the best-marked of the genera is *Prionornis*, the three species of which are widely spread over Central America and northern South America. It is known by the wide, flattened, curved bill, with a distinct ridge along the culmen, and exceedingly fine and numerous serrations on the edges of the maxilla and mandible. The tarsus is relatively short and the tail graduated as in *Momotus*. All the species are quite rare, perhaps the best-known being the Keel billed Motmot (*P. carinatus*) which frequents the dense forests of the interior. The Red-backed Motmot (*Eumomota superciliaris*) of Central America from Yucatan to Costa Rica is another handsome species, the adult male being grass-green above with the mantle cinnamon, and the wings and tail largely blue, while the sides of the face, cheeks, sides of the throat and neck, as well as fore neck and breast are green, and the sides of the body and abdomen pale ferruginous; there is also a broad superciliary band of white and cobalt-blue and a black throat patch which is bordered with blue. Writing of this exquisite bird as observed in Costa Rica, Mr. Nutting says: "It is common throughout the coast region, where it bears the rather insulting name of 'Bobo' [stupid]. In truth, it seems quite fearless, and seldom disturbs itself on account of human proximity. Although a very silent bird (I never heard its voice), its peculiar spatulate tail feathers are apt to attract attention. It seems to be solitary in its habits and not very industrious, as it is most often seen sitting on a limb not far from the ground apparently engaged in deep meditation, from which it is not aroused by the presence of the collector." Mr. L. J. Cole, who recently observed it in northern Yucatan, found it abundant about ancient ruins and adjacent buildings, where it roosted in holes in the masonry. "The time of my visit appeared to be before the nesting season; nevertheless the birds were at times very noisy, their note, which is suggested by the Maya name (Tŏh), being a characteristic sound for the Yucatan forest. They fly with small undulations."

The **Todies** (Subfamily *Todinæ*), which are comprised in a single genus (*Todus*) and five or six species, are curious, very tame, and unsuspicious little green and red plumaged birds, mostly under four inches in length, and in appearance quite like miniature Kingfishers. They have a relatively long, flattened but not serrated bill, rather short, rounded wings, and a square tail of twelve feathers. They differ structurally from the Motmots in having the four notches to the breast-bone open, and large functional cæca; their feet are like those of Kingfishers. Their food consists exclusively of insects, which they capture mainly on the wing after the manner of the Flycatchers or Bee-eaters, although they have occasionally been observed to glean among the branches of trees like the Wood-warblers. Of the feeding habits of the Cuban Tody (*T. multicolor*), Daniel says: "Its favorite haunts are the low bushes covering the hillsides and the tropical growth fringing the small streams of the ravines and valleys. . . . Sitting listlessly on a twig, while I stood a few feet away, it now and then suddenly darted out after insects, catching them with a quick snapping of its bill and returning to its perch to swallow them. The agility with which it pursued an insect, the suddenness

and quickness of the sally, was very much in contrast with the air of stupidity it assumed while at rest, showing that in spite of its apparent laziness it was nevertheless on the alert for its prey." In nesting habits the Todies accord with the other members of the great group to which they belong, since they excavate burrows in banks and lay pure white eggs, in appearance exactly like small Kingfishers' eggs. Taylor, in speaking of the Green Tody (*T. viridis*) of Jamaica, says: "The tunnels are very rarely, if ever, in high situations, but on the contrary may frequently be found at the sides of shallow ditches and hollows that are commonly formed in soft soil during heavy rains. I have often surprised the Todies at work. In beginning a tunnel they cling in an awkward manner to the face of the cliff or bank, fluttering the wings frequently as if for support. So far as I have been able to observe, in digging they appear to employ the beak only. . . . The burrows run horizontally and to a considerable depth, but invariably (so far as my experience goes) turn at right angles at a few inches from the entrance. The tunnel terminates in a somewhat rounded cell, where upon a little heap or bed of fine soft earth, without any lining whatever, the eggs are laid." The number of eggs in this, as with the other forms, appears to be three or four. Of the tameness of the Cuban Tody, Mr. Taylor adds that it "seems rather the tameness of indifference than of confidence. I have accomplished the capture of specimens with a butterfly net at different times with little difficulty, and frequently a Tody has permitted so near an approach that I have been tempted to put out my hand in the hope of taking it." They keep much in pairs, if not constantly, at least for the greater part of the year, and appear to wander but little, "returning constantly to the same twig, where they will patiently sit and watch, with head drawn in and beak pointing obliquely upward, the plumage much puffed out, the wings meanwhile being flirted by a continuous, rapid, vibratory movement." It is to be regretted that in many localities these engaging little birds are becoming rare, due in large measure to the introduction of the mungoose, which seeks the burrows, destroying the eggs and young as well as the old birds.

FIG. 152. — Green Tody, *Todus viridis*.

The various species of Tody are, with possibly one exception, confined in distribution to separate islands of the Greater Antilles. Thus the Green Tody (*T. viridis*) inhabits Jamaica, the Cuban Tody (*T. multicolor*) of course the island of that name, while other species are limited to Santo Domingo (*T. subulatus* and *T. dominicensis*) and Porto Rico (*T. hypochondriacus*), with one (*T. pulcherrimus*) of unknown habitat, but presumed to be from Jamaica. To give some idea of the beautiful appearance of these little birds, the following description may be given of the Green Tody, or Robin, as it is locally called. Only three and seven

RED-BACKED MOTMOT
(*Eumomota superciliaris*)

tenths inches long, the entire upper surface is bright grass-green, the wings blackish, the chin white, and the throat crimson, passing below into white washed with yellow, while the sides of the breast are green and the flanks ornamented by a tuft of pink feathers. Finally, mention may be made of a peculiar whirring noise made by the birds in flight, produced, it is said, by the attenuate outer primary.

THE KINGFISHERS

(Family *Alcedinidæ*)

The Kingfishers, of which there are fully two hundred species and subspecies now recognized, form a compact and exceedingly interesting group of practically cosmopolitan birds, which Dr. Sharpe well says "are alike remarkable for their brilliant coloration and for the variety of curious and aberrant forms included among their number." While there is not a little diversity in their appearance, in general, Kingfishers are small or medium-sized birds with compact bodies, very short and weak legs and usually short, rounded, but powerful wings. The head often seems disproportionately large, due mainly to the relatively very long, stout bill, and the more or less pronounced head-crest. The wings contain eleven primaries and from eleven to fourteen secondaries, while the commonly very short tail contains twelve feathers, though there is a group of some twenty Old World species in which the number of tail-feathers is reduced to ten, of which the central ones are greatly elongated — often exceeding the length of the body — and usually terminating in elegant racket-shaped expansions. The feet are undoubtedly the most uniform feature throughout the group, being anisodactyle, that is "unequal-toed," with the fourth toe united for more than half its length to the third, while the second is also united, but only at the base, with the third. In two genera (*Alcyone* and *Ceyx*) the second toe is aborted, hence these birds are only three-toed. Among other characters it may be mentioned that the sternum is two-notched, the furcula U-shaped, and the cæca absent, while the oil-gland is tufted, the contour feathers of the body are without aftershaft, and the young are born naked and helpless. The colors of the plumage, as already hinted, are often very beautiful, being in general bluish or greenish above and chestnut or red, variegated with white and black below, with the patterns tastefully arranged and the effect often heightened by a bright-colored bill. The sexes may be alike or unlike even in the same genus.

Habits and Distribution. — As the Kingfishers most familiar to English-speaking people are found in the vicinity of water and feed principally upon fish which they capture alive, it might be supposed that these habits would be characteristic the world over; such, however, is not the case, for while possibly the majority are water-haunting, fish-eating birds, a great many do not eat fish at all, nor do they haunt the vicinity of water, one, a native of Australia, living miles away from it, and where the heat is so intense that few animals can endure it. The food of the water-loving species consists, as stated, of fish varied with

occasional crustaceans; while the food of the others, which are variously known as Wood, Long-tailed, and Laughing Kingfishers, consists of crustaceans, insects, small reptiles, small mammals, and perhaps now and then a young bird. The attitude assumed by these birds is, however, quite characteristic throughout the group, it being their habit to sit motionless watching for their prey, to dart after it and seize it on the wing, and to return to their original position to swallow it. A favorite position of the fish-eating forms is a stub, some overhanging bough, or projecting stone, whence they keep a sharp lookout for their finny prey, or to hang on vibrating wings over the water, into which they plunge with closed pinions. The omnivorous forms also select some vantage point whence they dart after their prey. The flight of the Kingfishers is usually direct and strong, though not often prolonged for any great distance. In the matter of nesting there is diversity corresponding to their other habits. The fish-eating forms nest mostly in holes which they excavate for themselves in banks usually along streams, while the forest- or brush-haunting forms nest mainly in natural cavities in trees. The eggs of all, however, are uniformly white and unspotted.

The members of this family are distributed, though somewhat unevenly, throughout the entire world except in Arctic and Antarctic regions. Their center of distribution according to Wallace is the eastern half of the Malay Archipelago, from which point they decrease rapidly in numbers, Australia possessing but thirteen species and the entire New World only about a dozen. This last statement, as Wallace adds, "leads to the conclusion that America long existed without Kingfishers; and that in comparatively recent times — perhaps during the Miocene or Pliocene period — a species of the Old World genus (*Ceryle*) found its way into North America, and, spreading rapidly southward along the great river valleys, has become differentiated in South America into the few closely allied forms that alone inhabit that vast country — the richest in the world in fresh-water fish, and apparently the best fitted to sustain a varied and numerous body of Kingfishers."

The Kingfishers are birds of classical renown and many are the legends and myths concerning them, as attested by the following extract from the pen of Mr. Alfred Newton, the talented English ornithologist: "The Kingfisher is the subject of a variety of legends and superstitions, both classical and mediæval. Of the latter, one of the most curious is that, having been originally a plain gray bird, it acquired its present bright colors by flying toward the sun on its liberation from Noah's Ark, where its upper surface assumed the hue of the sky above it and its lower plumage was scorched by the heat of the setting orb to the tint it now bears. More than this, the Kingfisher was supposed to possess many virtues. Its dried body would avert thunderbolts, and if kept in a wardrobe, would preserve from moths the woolen stuffs therein laid, or hung by a thread to the ceiling of a chamber would point with its bill to the quarter whence the wind blew. All the readers of Ovid know how the faithful but unfortunate Ceyx and Alcyone were changed into Kingfishers — birds which bred at the winter solstice, when through the influence of Æolus, the wind god and father of the fond wife, all gales were hushed and the sea calmed so that their floating

nest might ride uninjured over the water during the seven proverbial 'Halcyon Days.'"

At first blush it may seem a far call from the typical fish-eating Kingfisher to a great fruit-eating Hornbill, and so it is, but the piscivorous Kingfishers undoubtedly represent the extreme degree of differentiation attained by any members of the family, while the most ancient types are apparently with equal certainty represented by the great Laughing Kingfishers (*Dacelo*), which in food, habits, and structure as well, are seen to approach most closely to the typical Hornbills. While no actual connecting links are perhaps known, it appears well authenticated that the Kingfishers and the Hornbills and their immediate allies, the Hoopoes, must have had a common ancestor, though granting that it was at a relatively remote period.

Typical Kingfishers. — The two hundred species of Kingfishers are disposed among twenty genera and are capable of being separated into two well-marked subfamilies. The first of these (*Alcedininæ*) comprises the so-called typical or true Kingfishers, in which there is a long, slender, compressed, and perceptibly keeled bill, combined with mainly fish-eating habits. Of the five genera comprised in this subfamily we may appropriately begin with *Ceryle*, which embraces all of the New World forms, and of these the best-known is of course the **Belted Kingfisher** (*C. alcyon*), which ranges over the whole of North America and south to Panama and the West Indies. It is too well known to need extensive description, yet briefly it may be mentioned that it is a stocky bird about thirteen inches in length, bluish gray above, with conspicuous white spots on tail and wings, and pure white below, interrupted by a broad band of bluish lead-color across the breast, while the white of the throat passes as a narrow band around the hind neck. The female is similar, but has the sides and a band across the belly rufous. This is the common Kingfisher whose rattling call is so frequently heard along our streams, ponds, and lakes, a bird alert, active, and seemingly "glad to be living." In disposition it must be classed as a rather unsociable and quarrelsome bird, and except at the nesting season it is rather rare to find two together. "Every bird," says Major Bendire, "seems to have favorite perches along its range, each perhaps quite a distance away from the next, to which it flies from time to time, generally uttering its well-known shrill rattle in doing so. It is a watchful, rather shy bird, sitting frequently for an hour at a time in the same position, occasionally moving its head backward and forward, watching for its prey as a cat does for a mouse. In such a position the Kingfisher is one of the most charming features of brook and pool. Should an unfortunate fish come within sight at such times, our lone fisherman is at once alert enough, craning its neck and looking into the water, until the proper moment arrives to plunge downward, head first, disappearing out of sight, and usually emerging with a wriggling captive firmly grasped in its bill."

The nesting burrow is usually excavated by the birds themselves, preferably in a bank along a stream or other body of water, but occasionally along a dry watercourse or railroad cut. The burrow varies in depth from four to fifteen feet, the nesting chamber being some eight or ten inches in diameter and on a

higher level than the entrance. The eggs, usually five to six but sometimes as many as ten, are placed on the bare ground, on a slight covering of grass, or if the nest is an old one, upon fish bones and scales, the remnants of former captures. "The young when first hatched are blind, perfectly naked, helpless, and, in a word, very unprepossessing. They scarcely look like birds while crawling about in the nest, where they remain several weeks, their growth being very slow."

Other American Kingfishers. — Much larger than the last species, reaching a length of sixteen or seventeen inches, is the handsome Ringed Kingfisher (*C. torquata*) of northwestern South America and Central America, and northward casually to the lower Rio Grande Valley in Texas. The under parts except for the white throat are nearly all bright chestnut. Their habits, including the selection of the nesting site, are similar to those of the common American species. The only other North American species is the Texan Kingfisher (*C. americana septentrionalis*), which ranges from Panama north through Central America and Mexico into southwestern Texas. Only eight inches long, it is a metallic bronzy green or bottle-green variously speckled with white above and white, spotted with greenish below, the male with a reddish chestnut band across the breast. They nest in banks along streams and have habits similar to those of the other species mentioned. Of wide distribution throughout South America is the Little Kingfisher (*C. americana*), the parent form of which the last-mentioned is a northern geographical race. Mr. Barrows found it "resident throughout the year at Concepcion, but especially abundant in winter, where it haunts the main river, the island shores, and all the streams, big and little; it is not in the least shy." The largest of the white-bellied group of American green-backed Kingfishers is the handsome Amazonian Kingfisher (*C. amazona*), which is widespread throughout Central and South America. About twelve inches in length, it is almost precisely similar in coloration to *C. americana*, of which it is, figuratively, a "large edition." It is very abundant throughout the whole of the Amazon region, nesting in an extremely deep hole in flat-faced banks along rivers, and laying usually four eggs. Similar but much smaller is Cabanis's Green Kingfisher (*C. cabanisi*) of Peru, while of about the same size, but with the whole under surface orange-chestnut, is the Rufous and Green Kingfisher (*C. inda*) of Central and South America. The little Green and Orange-colored Kingfisher (*C. superciliosus*) is the pygmy among American forms, attaining a length of only five inches. The male is shining green above and reddish orange beneath, the neck with a ring of white, and the forehead, sides of the head, and wing-coverts are spotted with ochre or pale reddish. This species ranges from Bolivia and Brazil north to Guiana and Trinidad.

Pied Kingfishers. — Of wholly different appearance, which has won for them the collective name of Pied Kingfishers, are the five Old World members of the genus. Of these the true Pied Kingfisher (*C. rudis*) is perhaps best known, being widely distributed from Asia Minor to the Persian Gulf, Palestine, Egypt, and tropical Africa. About eleven inches in length, it has a conspicuously crested head, the plumage above being black marked and varied with white,

while the under parts are pure white with the breast crossed in the male with two, and in the female by a single, black band. "Its flight," says Mr. Dresser, "is not very swift, but direct and steadied by regular beats of the wings. It frequents both inland waters and the seacoast, and is gregarious at all seasons," breeding in April or May in holes excavated in banks along streams and laying four to six eggs. Similar to this but a little larger and having more distinct black malar lines is the Varied Kingfisher (*C. varia*) of the Indian peninsula, Ceylon, and China, while to the northward in the Himalayas, the Burmese provinces, and Japan occurs the Himalayan Spotted Kingfisher (*C. guttata*), which is a very wild, shy bird, usually seen in pairs and extremely difficult of approach. It feeds exclusively on fish, for which it watches from a bush or bough overhanging the water, and nests in banks, laying only three or four glossy eggs. The remaining species are African.

Fig. 153. — European Kingfisher, *Alcedo ispida*.

Stork-billed Kingfishers. — Agreeing with the genus *Ceryle* in having the tail longer than the bill, but differing in having the sexes similar in plumage, are the dozen or more species of *Pelargopsis*, which from the very large, sharp-pointed bill have appropriately obtained the collective name of Stork-billed Kingfishers. Confined to the Oriental region from the Indian peninsula and Ceylon to Java, Sumatra, Borneo, and the Philippines and Celebes, they are further distinguished by having bright blue backs and with a single exception coral-red bills; in length they are between twelve and fourteen inches. As one of the best-known we may select the Indian Stork-billed Kingfisher (*P. gurial*), a rather handsome bird, the head dark chocolate-brown, the sides of the neck and neck-collar pale ochre, while the wings and upper back are dull green, the remainder of the back a rich greenish cobalt, and the entire under surface ochreous buff. Of the three remaining genera of the subfamily, in all of which the bill is longer than the tail, the genus *Alcedo* is widespread over the Old World, with the exception of Australia and Polynesia, one of the best-known being the little European Kingfisher (*A. ispida*), which ranges throughout Europe and Asia and thence over the Indian and Malay peninsulas to the Philippines. About seven inches long, it is azure-blue above and rusty orange-red beneath. It is the only Kingfisher, except an occasional rare straggler, which reaches the British Islands, where it is looked upon as the most brilliantly colored bird visiting that country. Formerly abundant, it was much persecuted and seemed likely to be entirely driven out, but in later years it has been more or less protected and has again become tolerably common. It has habits very similar to those of our Belted Kingfisher, frequenting streams and rivers, the margins of lakes and, more rarely, the seashore. It feeds mainly on fish, but also on tadpoles, water insects, and occasional crustaceans, the latter especially in the fall, as it frequents the seaside before

migrating. The nesting site is a burrow in a bank usually near water but sometimes at a distance of a mile or more. The eggs, six to eight in number, are placed on a bed of fish bones in a nest cavity some six inches in diameter at the termination of the hole.

The **Crested Kingfishers** (*Corythornis*) are, as the name implies, conspicuously crested, bright-plumaged birds not exceeding five inches in length; of the three species, *C. cristatus* of Madagascar is shown in the figure (page 500); their habits are similar to those of the common species just described, as are the habits of the three-toed Australian Kingfishers (*Alcyone*).

This brings us to the confines of the other subfamily (*Daceloninæ*), which, while not very sharply differentiated from the first, is nevertheless distinguished by having the bill more or less depressed or flattened or sometimes even grooved, while the habits are more insectivorous or reptilivorous, and hence the members are not so dependent upon the presence of water. They do not altogether disdain an occasional fish, but for the most part they haunt the forests and brush- and jungle-covered country, often a long way from water; their nesting habits, as already pointed out, are also different. This subfamily comprises the great majority of the members of the family, some fifteen genera and not less than one hundred and fifty species falling within its limits, and while there is a group of four large genera in which the tail is as short as in any of the fish-eating forms, in certain of them this member is extremely long and variously ornamented, and in plumage, too, they are among the most brilliant of birds, principally a beautiful cobalt-blue combined with red and black and yellow in tasteful contrast.

Three-toed Kingfishers. — Among the short-tailed forms the little Three-toed Kingfishers (*Ceyx*) of the Indian and Malayan regions are certainly worthy of mention. Of the twenty-two species now recognized the Indian Three-toed Kingfisher (*C. tridactyla*) is perhaps best known, being a bird five and a half inches in length, with the general color above black, washed with purplish blue or deep ultramarine on the mantle; the lower back, rump, and upper tail-coverts red, washed with beautiful lilac; the wing-coverts black edged with blue; the tail-feathers cinnamon-rufous; the head rufous marked with lilac; cheeks and ear-coverts orange-yellow, as are the under parts; bill and feet bright vermilion-red. This little feathered gem, according to Mr. Blanford, is a forest bird, usually found singly or in pairs by hill streams, but sometimes away from water. It feeds to a large extent upon small fish and probably aquatic insects, and has a shrill, piping note. It nests in holes in sandy banks, often at a distance from water, and lays from four to six or seven very small eggs.

Laughing Kingfishers. — Lack of space forbids extended mention of the equally brilliant species of *Ceycopsis* of the Celebes and Sangi islands, *Ispidina* of Africa and Madagascar, and *Myioceyx* of West Africa, all being tiny species under five inches in length and one (*Myioceyx lecontii*) being only three and three quarters inches long. In sharp contrast with these, both as regards size and plumage, is the huge, thick-billed *Clytoceyx rex* of the mountains of southeastern New Guinea, and the so-called Laughing Kingfishers (*Dacelo*) of Australia and

New Guinea. The best-known of these is the Laughing Jackass, or "Bushman's Clock" (*D. gigas*), a giant Kingfisher over seventeen inches in length, the plumage above being brown, becoming greenish blue on the lower back and on the median wing-coverts, while the white of the lower parts extends as a broad collar around the neck and forward above the eye; the tail is bright rufous barred with black and, with the exception of the central pair of feathers, tipped with white. The female is similar to the male, but has more rufous on the crown and ear-coverts. This, says Mr. Gould, "is a bird with which every resident and traveler in New South Wales is more or less familiar, for, independently of its large size, its voice is so extraordinary as to be unlike that of any other bird." This voice, which has won for it the seemingly incongruous appellation, is variously described, some calling it a "gurgling, laughing note," others a "gurgling laugh, commencing in a low and gradually rising to a high and loud tone," while Captain Sturt says, "Its cry, which resembles a chorus of wild spirits, is apt to startle the traveler who may be in jeopardy, as if laughing and mocking at his misfortunes." The "Old Bushman," whose delightful "Bush Wanderings of a Naturalist" has been read by so many, says: "About an hour before sunrise the bushman is awakened by the most discordant sounds, as if a troop of fiends were shouting, whooping, and laughing around him in one wild chorus; this is the morning song of the 'Laughing Jackass,' warning his feathered mates that daybreak is at hand. At noon the same wild laugh is heard, and as the sun sinks into the west, it again rings through the forest." The Laughing Jackass is a tame, even prying and inquisitive bird, coming about camping parties and others in the brush and watching with evident interest all that transpires. "It frequents every variety of situation; the luxuriant bushes stretching along the coast, the more thinly timbered forest, the belts of trees studding the parched plains, and the brushes of the higher ranges being alike favored with its presence." It feeds on a great variety of things, such as reptiles, insects, crabs, small mammals, etc., and places its nest in a hole in a large green tree, laying two pearl-white eggs on the chips and decayed wood at the bottom. The other species of the genus in which the tail is blue in the male and rufous in the female are the Buff Laughing Kingfisher (*D. cervina*) of Northwest Australia, Leach's Laughing Kingfisher (*D. leachii*) of Northeast Australia, and the intermediate species (*D. intermedia*) of New Guinea; they all possess peculiar voices, but none is quite so extraordinary as that of the one first mentioned.

FIG. 154. — Laughing Jackass, *Dacelo gigas*.

Wood Kingfishers. — Although not possessing any very marked character-

istics beyond a beautiful plumage, it will hardly do to pass over the Wood Kingfishers or Kinghunters (*Halcyon*), of which over seventy species are now recognized, these being widely spread over southern Asia, the whole of Africa and the Australian and Indian regions, and Pacific islands. They are distinguished by having rather short, rounded wings and a compressed bill which has a more or less distinct groove along the sides. Many of them do not frequent streams or feed upon fish, but are found often at a great distance from water in the forests, where they feed upon insects, crustaceans, small reptiles, etc., and whence their name of Kinghunters to distinguish them from the piscivorous Kingfishers. Omitting further mention of these and passing over two or three small allied genera, we come to the final genus (*Tanysiptera*), which comprises the splendid Long-tail or Racket-tailed Kingfishers, of which over twenty species are recognized ranging over the Moluccas, the Papuan Islands, and portions of northern Australia. The principal character of this genus is the tail of ten feathers, of which the central pair are greatly elongated, — indeed, often extending the length of the body, and terminating in spatulate or racket-shaped expansions. Many of them are very rare birds and but seldom obtained, and Mr. Wallace, the great traveler-naturalist who discovered several species, states that he found them in forests. He also secured specimens sleeping in cavities of the rocky banks of streams; but little is known of their habits. All are extremely beautiful birds, to show which we may describe the Red-breasted Kingfisher (*T. nympha*) of the interior of northwestern New Guinea. The head is a rich ultramarine, inclining to cobalt on the nape; ear-coverts and upper part of the back and scapulars jet-black; lower part of back, rump, and upper tail-coverts rich vermilion; wing-coverts black edged with ultramarine; tail-feathers deep blue, the exterior ones tipped with white, the two middle ones with rich blue, the spatula long and white with a faint blush of rose; entire under surface rich vermilion; bill and feet, sealing-wax red; eyes black; the total length about eleven inches. Much larger and of quite different coloration is the Morty Island Kingfisher (*T. doris*), which, in addition to the brilliant cobalt head, blue-black shoulders, and black wings, has the upper part of the head pure white, the lower back white edged with light blue, and the tail-feathers white margined with blue, the central pair blue throughout and the entire under surface white; the bill and feet are bright red.

THE BEE-EATERS

(Family *Meropidæ*)

The Bee-eaters — so called from their insectivorous habits — constitute a compact and well-marked group of small or medium-sized birds of brilliant plumage and graceful habits, confined in their distribution to the temperate and tropical portions of the Old World. They show evident points of relationship with the Rollers, Jacamars, and Kingfishers, agreeing with the latter especially in the form of feet, and in the economy of nature seem to fill the place in

RACKET-TAILED KINGFISHER
(*Tanysiptera nais*)

the Old World occupied by the Jacamars in the New World. They have a long, slender bill which is gently curved throughout and provided with a well-marked ridge on the culmen. The legs and feet are feeble and syndactyle, that is, the fourth or outer toe is united to the middle toe as far as the last joint, while the second and third toes are united by the basal joint only. The primaries are ten in number and the tail-feathers twelve; the sexes are alike or nearly so in plumage. The Bee-eaters are disposed among five genera and about forty species, of which more than half are confined to the Ethiopian region, but they are also well represented in the Indian and Australian regions, with a limited number extending into the Palæarctic region. They are for the most part social and gregarious birds, even during the breeding season, and frequently nest in colonies. They are arboreal in their habits, frequenting forests and plains and showing a special liking for the vicinity of rivers, in the banks of which they mostly make their nest burrows. These holes, which they excavate for themselves, often extend for six or eight feet into the bank; the eggs, without exception, are pure white and glossy. The notes of the Bee-eater are usually described as harsh and unmelodious.

Swallow-tailed Bee-eaters. — The first genus to be considered (*Dicrocercus*) is exclusively African, and is distinguished at once by the long, deeply forked tail, whence the species are called the Swallow-tailed Bee-eaters. Of the two known species, one (*D. furcatus*) is found in West Africa, while the other (*D. hirundineus*) comes from the eastern and southern parts of the continent. The first-mentioned species is a bird about eight inches long, of a golden green above, becoming cobalt-blue on the forehead and upper tail-coverts, while the primaries are pale chestnut edged with greenish and tipped with black, and the tail is greenish blue and golden olive, all but the middle and outer pairs tipped with white; there is a broad black stripe through the eye and ear-coverts which is succeeded by a narrow ashy white streak, while the cheeks and throat are orange-yellow, the lower throat ultramarine-blue, and the remainder of the lower parts greenish blue. The other, slightly larger species is similar in coloration, differing only in the absence of blue on the forehead and eyebrow. Their habits are apparently similar to those of Bee-eaters in general.

The **Square-tailed Bee-eaters**, comprised in the genus *Melittophagus*, are distinguished at once by their square tails, thus differing from the Swallow-tailed on one hand and from the true Bee-eaters (*Merops*), in which the central pair of feathers are elongated, on the other. They are birds of relatively small size, ranging between six and nine inches in length, having a rather slender bill, rather short, rounded wings, in which the third quill is longest, and small, stout feet. The general coloration of the plumage is green, with strong contrasts of blue, yellow, and black. Although they are to some extent gregarious, they are perhaps less so than the true Bee-eaters, and are rarely seen in large flocks. They frequent especially watercourses as well as swamps and marshy localities, and feed on insects which are captured on the wing. Their notes, like those of their relatives, are harsh and monotonous. Thirteen of the fifteen species of Square-tailed Bee-eaters are confined to Africa, the remaining two spreading

quite widely over the Indo-Malayan region. One of the most engaging species is the Little Bee-eater (*M. pusillus*) of Northeast and West Africa. Only about six inches long, the upper parts are bright Parrot-green, the primaries bright rufous, as are all but the central pair of tail-feathers, these being green like the back; the chin and throat are yellow, a broad patch of black passing from the base of the bill through and behind the eye, while the lower throat is covered by a broad band of black which is edged above with blue and passes below into the

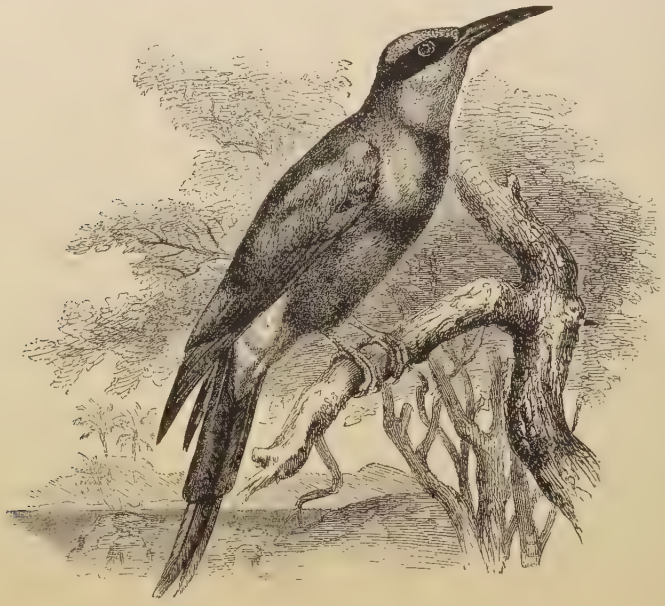


Fig. 155. — Green-throated Bee-eater, *Merops nubicus*.

rufescent orange of the under parts. This species lives in pairs and small families and is quite lively and noisy. According to Von Heuglin: "It affects low bushes, thickets overgrown with grass and creepers, cotton-fields, hedges, gardens, and maize-fields, wherever there is water near, and it does not occur in the large dry steppes. On the Gazelle River, I found them inhabiting the swamps, perching like a Kingfisher on the reeds and papyrus-like plants, from whence it pursued insects, especially flies." Their pure white, rosy-tinted eggs are probably deposited in holes in banks. The Chestnut-headed Bee-eater (*M. swinhoii*) is also a handsome bird, ranging throughout the Indian peninsula, preferring forests or well-wooded districts near streams. The head, hind neck, and upper back are bright chestnut, the wings and their coverts bright green, and the lower back and upper tail-coverts bright blue; the throat is a rich yellow, succeeded below by a rich chestnut and then a black band which passes into yellow and then into the green of the under parts. "It is usually seen in pairs,"

says Colonel Legge, "and is very arboreal in its habits, sitting on the topmost or most outstretching branches of trees overhanging water, and darting thence on its prey, and is a pretty object, with its bright green plumage and glistening rufous head, as it darts from the fine old trees lining the forest rivers down to the edge of the sparkling stream, and glides over the sandy bed, quickly catching up some passing insect." The nesting burrows, always made by the birds themselves, are in a bank and extend to a depth of from eighteen inches to nearly seven feet, the tunnel often turning abruptly in its course and being enlarged at the end into a chamber some six inches in diameter. The eggs, three to five in number, are placed on the bare earth.

True Bee-eaters. — The true Bee-eaters (*Merops*) differ from the last in having a relatively longer, pointed wing in which the second quill is longest, and in having the two central tail-feathers elongated and pointed; they are also somewhat larger in size. Of the twenty-one species now recognized a majority are found in the Ethiopian region, while the others are widely scattered over the southern Palæarctic region and the Indo-Malayan and Australian regions. The European or Common Bee-eater (*M. apiaster*) is one of the best known, being about ten and a half inches long, and very handsome in rich chestnut, blue, green, yellow, and black, and, as Mr. Dresser well says, "is certainly one of the most brilliantly colored and conspicuous of European birds; and in the rich sunshine of the south there are few more beautiful sights than a flock of these birds hawking after insects." They are gregarious at all seasons and are quite Swallow-like in appearance when on the wing, as they hawk after insects. Their burrows are usually excavated in a bank, but occasionally in flat ground away from water. Among the most brilliant members of the genus are the Green-throated and Carmine-throated Bee-eaters (*M. nubicus* and *M. nubicoides*), the first of northern tropical, and the latter of South Africa. In the Green-throated the head and throat are bluish green, the back and under parts generally a rich, deep rosy red or pale carmine with a tinge of vermilion, while the wings are dull red washed with green, the rump and upper and under tail-coverts rich blue, and the long tail dull red. The Carmine-throated is slightly larger than the other and is similar in coloration except that the entire chin and throat are a rich, bright red. Their habits are in accord with those of their relatives.

Plumed Bee-eaters. — In the preceding genera the feathers of the breast are of ordinary form, but in the two remaining genera the breast plumes are broad, elongated, and pendent, producing a very elegant appearance. Of these Forsten's Bee-eater (*Meropogon forsteni*), the sole representative of its genus, is confined to Celebes. It is largely green above with the forehead, throat, and breast a deep, glossy cobalt-blue, while the hinder crown, nape, neck, and lower abdomen are blackish brown; the central pair of tail-feathers are elongated as in *Merops*. This species, according to Dr. A. B. Meyer, who wrote some thirty years ago, frequents the higher trees in the densest forests, and although it is not often seen, it is hardly rare in suitable locations.

Bearded Bee-eaters. — Quite similar to the last as regards the breast plumes,

Fig. 156. — Madagascar Bee-eater, *Merops madagascariensis*.
Crested Kingfisher, *Corythornis cristatus*.

but differing in possessing an even tail and more densely feathered nostrils, are the two species of Bearded Bee-eaters (*Nyctiornis*), which range from India through Burma and the Malay Peninsula to Sumatra and Borneo. Both are thirteen or fourteen inches long, the Red-bearded (*N. amicta*) being largely grass-green above, with the lores and forehead pink, the throat and breast plumes scarlet, and under parts pale green. The Blue-bearded species (*N. athertoni*) has the forehead, throat, and breast a rich turquoise-blue, the other parts being

largely greenish. They are forest haunting birds, usually seen solitary or in pairs, perching on the higher trees and feeding on insects, which they capture on the wing. Their nesting habits so far as known are similar to those of Bee-eaters in general.

THE HORNBILLS

(Family *Bucerotidæ*)

It is hardly necessary to state that the Hornbills comprise a very remarkable and strongly marked group of birds, the members of which are not likely to be confounded by even the casual observer with any other group, unless perhaps the Toucans; but as the latter are exclusively Mexican to South American, while the Hornbills are confined to the Old World, the possibility of such confusion is reduced to a minimum. Curiously enough these great birds, with such grotesquely enormous bills, appear to find their closest relationship with the graceful little Hoopoes; so closely, in fact, are they related that Gadow would only accord them subfamily rank under the *Upupidæ;* but the differences in structure, appearance, and life habits are so very marked that they seem entitled at least to full family rank, and many systematists have placed them still higher. Their resemblance to the Toucans is brought about by the somewhat similarly appearing large bills, but this likeness is quite superficial, and there is really no close relationship between them.

Structure. — The Hornbills are mostly birds of large size, several exceeding four feet in length, and few falling under two feet. They are chiefly remarkable for the large, often very large, bill which is surmounted in many species by a casque, which may itself be so large as to appear like a second bill above the other, while in other forms it is quite rudimentary or even reduced to a mere keel. The bill and casque, in all but one of the Hornbills, is hollow with quite thin walls and supported inside by a cancellated bony structure. In the Solid-casqued Hornbill (*Rhinoplax*), as the name implies, the whole of the anterior wall is solid. In a majority of forms the casque is closed, the exception being in the Ground Hornbills (*Bucorax*), in which it is more or less open in front, giving them a very peculiar appearance. Structurally the Hornbills have the palate of the bridged (desmognathous) type, no basipterygoid processes or cæca, while the breast-bone is broad behind and provided with two notches as in the Hoopoes; the whole skeleton is unusually pneumatic. Among other more or less important characters it may be mentioned that they have well-developed eyelashes, a feature not common among birds, usually large, powerful wings, and a tail of ten feathers, the central pair of feathers being in some cases much longer than the others. The wings are further peculiar in that the under coverts do not cover the basal parts of the quills, and it has been suggested that it is the air rushing between the bases of the quills that produces the loud sound heard when they are in flight, a noise that has been likened to a railway train at a little distance.

Nesting Habits. — The nesting habits of the Hornbills are without a parallel in the bird world. This chapter in their life history was naturally received with incredulity when first brought to scientific attention, but has since been abundantly confirmed by competent observers. Selecting a cavity of suitable size in the trunk or a large limb of a tree, the female enters, even before depositing the clutch of eggs, when the male, assisted to some extent by the female, proceeds to wall up the entrance with mud, sometimes mixed with the bird's own droppings or composed entirely of the latter substance, leaving only a narrow slit through which the tip of the bill of the female may be thrust to receive the food passed in by the male outside. Within these cramped quarters the eggs are laid and incubated, and the young, born naked and helpless, are cared for until they are nearly or quite fledged, before the barrier is broken down and the mother and offspring liberated. The male is said to be very assiduous in supplying the female with food, and after all her incarceration may not be such a hardship as it would at first seem, for if dragged forth both she and the young are found to be in excellent flesh, a circumstance well known to the natives, who lose no opportunity in securing the occupants of a nest whenever they can find one. The nest cavity, as may be supposed, presents a very unsanitary appearance and odor, and when the female is hauled out she likewise presents a bedraggled and forlorn presence, being unable to fly or even stand up. But as if all this was not a sufficiently severe ordeal, it appears that the female undergoes a complete moult during the imprisonment. This fact, like so many others in the economy of the Hornbills, was at first deemed impossible, but it is now settled beyond question as true. Some years ago Dr. Günther of the British Museum exhibited before the Zoölogical Society of London the hollow trunk of a tree from Graham Town, Cape Colony, in which a Hornbill (*Lophoceros melanoleucus*) had nested. He said: "The female when taken was unable to fly and was simultaneously moulting all the wing- and tail-feathers, thus presenting the appearance of a half-fledged young bird. This species, therefore, confirms the observation made on other species of the genus, viz., that the Hornbills pass through a complete moult in the six or eight weeks during which they are imprisoned with the eggs and young." The eggs are from two to three or four in number and are white when laid, but they soon become soiled and discolored. Another of the remarkable phenomena connected with the life history of the Hornbills, brought to scientific attention by Bartlett, Flower, and Murie, and since confirmed by others, is the so-called vomiting up of gizzard-sacs containing food. That is, at intervals during the nesting period, and perhaps at other times, the males of certain species throw up a sac some three inches long and two inches in diameter, in which is contained nuts, fruit, and berries, which it is supposed is passed to the female during her incarceration, and which serve to supply her with the necessary food. The structure of these sacs has been investigated and demonstrated to be a sort of lining to the gizzard found inside the regular lining of this organ and thrown up practically entire. The sac is apparently formed by the rapid development of the cells just below the inner

surface of the gizzard and is pushed off entire, retaining, of course, all the sinuosities, elevations, and depressions of the mucous folds of that organ. This is apparently an adaptation which permits of the male supplying the female with sufficient food at one visit to last her for some time, thus obviating the necessity of repeated visits, which would be likely to disclose the location of the nest, though it is difficult to understand how such condition could have been developed. The interval of time between the production of these sacs is unknown, but if it is the only or usual manner in which food is passed to the female, the development must of necessity be limited to a few days at most. In any event, the female appears to be abundantly supplied with food, for, as above stated, when removed from her prison, she is found to be fat.

Food. — The food of the Hornbills is considerably varied, consisting principally of fruits and insects, but also of snakes, lizards, small mammals, birds, and eggs, as well as flowers, growing shoots, and among the ground-inhabiting species of roots, tortoises, etc., and in fact about everything that comes in their way. They usually beat the life out of such animals as they capture and swallow them whole, by a backward jerk of the head, as they do all their food.

The Hornbills number about seventy species, and, according to Sharpe, are disposed among twenty-one genera, but there is not complete agreement among ornithologists as to the number of genera that can be satisfactorily recognized. They are all natives of the Old World, ranging from Africa through the Indian and Malayan countries to Celebes, New Guinea, and Solomon Islands, nearly half of the species being confined to Africa. They have been separated somewhat roughly into three groups, sometimes called subfamilies, the Ground Hornbills (*Bucoracinæ*), the True Hornbills (*Bucerotinæ*), comprising the majority of the species, and the Solid-casqued Hornbills (*Rhinoplacinæ*), with a single genus and species.

African Ground Hornbills. — Of the Ground Hornbills there is but a single genus (*Bucorax*) and two species, both African. They are large birds, forty to forty-three inches long, and have the entire plumage black, except the primaries, which are white. They differ principally in the form of the casque, this, in the Abyssinian Ground Hornbill (*B. abyssinicus*) of Northeast and West Africa, being wide open in front, while in the South African Ground Hornbill (*B. caffer*) it is closed or only slightly open. A further mark of difference is the color of the bare skin of the neck and around the eye, this being blue in the first species and bright red in the second. While the habits of the two species are apparently similar, those of the South African bird are perhaps better known. This species, known to the Boers as the *Brom-vogel*, is not uncommon in many parts of the country, keeping much to the open or sparsely wooded districts, and usually seen in small parties of a dozen or less, although occasionally congregating in large flocks. Their superstitious regard by the native black men is well known, as the following account from Mr. H. Bouker attests: "There are many superstitions connected with the *Brom-vogel*, the bird being held sacred by the Kaffirs, and is only killed in times of severe drought, when it is killed by order of the 'rain-doctor,' and its body thrown into a pool in a river. The

idea is, that the bird has so offensive a smell that it will 'make the water sick,' and that the only way of getting rid of this is to wash it away to the sea, which can only be done by heavy rains and flooding of the river." Of the habits of these Hornbills in Natal, Mr. Ayres says: "These birds are gregarious and to be found here all the year round, but not very plentiful, generally three or four, sometimes more being found together. They are very fond of hunting for their food on ground from which the grass has been burnt; with their strong bills they peck up the hard ground, and turn over lumps in search of insects, making the dust fly again; having found an insect or other food, they take it up, and giving the head a toss, the bill pointing upward, appear to let the food roll down the throat. They also kill large snakes." The nest is said to be placed in a hollow tree, and the eggs to be large and white.

Rhinoceros Hornbills. — The remainder of the Hornbills, with a single exception, comprise the true representatives of the group, and may be typified by the Rhinoceros Hornbills (*Buceros*), the bills of which appear to have been the first to find their way to Europe at least as early as 1599, where they created no little surprise and wonder. These Hornbills, of which two species are known, are birds of very large size, with a large, stout, and considerably curved bill, and a large, wedge-shaped, elevated casque. The true Rhinoceros Hornbill (*B. rhinoceros*), which inhabits the Malay Peninsula, Sumatra, and Borneo, has a total length of forty-five inches and a wing of eighteen inches; the head, neck, back, wings, and breast are black, glossed with steel-blue on back and wings, while the rump, upper and under tail-coverts, thighs, abdomen, and tail are white, the latter with a subterminal band of black. The bill is whitish yellow, and the mandibles and casque black, while the remainder of the casque is red, shading to orange on the lower part. This species, as indeed are all the true Hornbills, is arboreal in its habits and feeds largely on fruit, but it will also take a great variety of substances when it is held in captivity, as it frequently is by the natives and others. The following account is from the pen of Mr. C. F. Adams, who collected for some time in Northeast Borneo: "They are abundant in those regions along the rivers where fruit trees occur, and their peculiar, sonorous notes can be heard at a considerable distance. Although these birds were numerous and could easily be located by their calls, they were difficult to procure. So far as wariness is concerned, they can put a Crow to shame, and it is very seldom that one can be approached within gunshot. Owing to their striking colors, they are very conspicuous objects in the trees, a fact of which they seem to be aware. Their flight consists of several rapid wing beats, followed by majestic sailing, during which they gradually rise to a greater elevation. The sound produced by their wings during flight is astonishingly loud and often betrays their presence to a collector." The other species (*B. sylvestris*), found in Java and Sumatra, is similar in appearance but much larger, being forty-seven inches long, and has a larger casque, which is, however, only slightly curved upward at the front.

The **Two-horned Hornbill** (*Dichoceros bicornis*) of the Indo-Chinese countries, the Malayan Peninsula, and Sumatra is the largest member of the group, being

nearly five feet long and having a very large, much-curved bill, and a large, broad casque with the upper surface concave in front and terminating in two laterally projecting points. The plumage is black and white, while the greater wing-coverts and quills are black with their bases and ends white, and the tail yellowish white with a broad subterminal black band on each feather; the bill and casque are yellow, tinged with red at the tips and orange in the middle. The female is slightly smaller but otherwise is similar in all but the color of the casque. This great bird is a forest species, keeping much to the tall trees and rarely if ever descending to the ground. It goes about in pairs, or more often in flocks of from five to twenty or more, making its presence known by the great noise produced by its wings in flight, a sound that may often be distinguished for a mile or over. It feeds largely on fruit, but insects and lizards are also eaten. The eggs, two or three in number, are laid in the usual manner, that is, in hollow trees with the entrance walled up with mud.

Fig. 157. — Two-horned Hornbill, *Dichoceros bicornis*.

Naked-throated Hornbills. — In the forms thus far mentioned the chin and throat are feathered, but we now come to a group of five genera in which these parts are naked. Of these two are confined to the Philippine Islands, — *Gymnolæmus*, with a single species having a large, swollen, though somewhat compressed casque, and *Penelopides*, with six species ranging in length from nineteen to twenty-four inches and having a compressed casque of moderate size, and the basal half of both mandibles covered with a grooved plate. Another genus, *Rhytidoceros*, of five Indian and Oriental species, is distinguished by having a small, low, rounded casque which is apparently composed of imbricated plates, and there are somewhat similar plates on the base of the bill. One of the best-known species is the Malayan Wreathed Hornbill (*R. undulatus*), a bird forty-five inches in length, with the plumage mainly black, glossed with dark

green and purple, except on the forehead, middle of the crown and nape, which are deep chestnut, and the sides of the head and crown, as well as much of the front of the neck, which are buffy white; the tail is entirely white. The female is black throughout with the exception of the white tail; the length is only about thirty-eight inches. They are powerful, steady-flying birds of the forests, feeding almost entirely on fruit and going about in considerable flocks. Blyth's Wreathed Hornbill (*R. subruficollis*) is similar but smaller, the male being only thirty-four inches long.

Wedge-tailed Hornbills. — Whereas in the foregoing genera the tail is nearly or quite square at the end, in the remaining forms the central pair of feathers are much longer than the outer pairs, whence they are collectively known as the Wedge-tailed Hornbills. Of these the Pied Hornbills (*Anthracoceros*), the five species of which are widely spread throughout the Oriental regions, have a very large, high, and sharp-edged casque, which projects in front and is broader and carried back above the crown behind. The Malabar Pied Hornbill (*A. coronatus*), as the name implies, is pied black and white, while the tail is black with the exception of the elongated central pair, which are white. They frequent especially the dry forests of the low country and have habits similar to those of all the large Hornbills. As an example of those in which the casque is rudimentary or practically absent, mention may be made of the Rufous-necked Hornbill (*Aceros nepalensis*) of the eastern Himalayas. In this bird, the sole representative of its genus, there is no true casque, but the upper mandible is somewhat thickened at the base and is crossed at the sides by a number of dark oblique grooves. Its length is about four feet and the plumage black, glossed with dark green except on head, neck, and lower parts, which are rufous. Still another form with a small casque is the Bushy-crested Hornbill (*Anorrhinus galeritus*), which is distinguished by a well-developed bushy crest. This species, according to Davison, is a shy bird, going about in small parties of five or six and keeping to the high forest trees.

African Wedge-tailed Hornbills. — The African region is also the home of a number belonging to the wedge-tailed group, among them *Lophoceros*, which is not only the largest genus, embracing no less than nineteen species, but contains the smallest of the Hornbills. They may be known by the moderate, curved bill, which is with or without a small, keel-shaped casque, while the tail is only moderately wedge-shaped and the head provided with a low crest of soft feathers; the plumage is white below but variously marked above. Perhaps the smallest known species is the Hartlaub's Hornbill (*L. hartlaubi*) of West Africa, sometimes separated as the type of a separate genus (*Horizocerus*), which is only fifteen inches long; it is blackish gray above and dark gray below. Considerably larger is the Red-billed Hornbill (*L. erythrorhynchus*) of Northeast and Northwest Africa, which may be known by the dark red bill. This species, as well as others of its relatives, seeks most of its food, which consists of fruit and insects, on the ground. Another species is the Yellow-billed Hornbill (*L. flavirostris*), so called from its orange-yellow bill, and which Mr. Andersson says is a common bird in Damara Land, where it is "found singly or in pairs, and being a comparatively

fearless bird is easily killed, especially during the heat of the day, when it invariably perches on or near the top of a lofty tree, and will remain for hours in this situation, keeping up, with short intermissions, a kind of subdued chattering note of *toc toc toc tocke tocke tocke toc*, in a tone not unlike the quick yelping of young puppies, and accompanied at intervals by a flapping and raising of its wings and alternately lowering and erecting its head." An allied species is the White-crested Hornbill (*Ortholophus albocristatus*) of West Africa from the Cameroons to the Congo.

Gray Hornbills. — Closely allied to these, and by some included with them, are the three species of the genus *Ocyceros*, which inhabit the Indian peninsula and Ceylon; they are separated mainly on account of their more wedged-shaped tail. The Common Gray Hornbill (*O. birostris*) is a small species about two feet long, light brownish gray above and white below, while the tail, which is eleven and a half inches long, is brownish with a broad subterminal band of black. This little Hornbill, Mr. Blanford says, "is generally seen in small parties about open jungle, groves of trees, and gardens, but not in thick forests. It lives chiefly on fruit, but occasionally eats insects also. It has a harsh cry and an undulating flight, with alternate flappings and sailings." The Malabar Gray Hornbill (*O. griseus*) of the Malabar coast is a shy forest species with more rapid and easy flight than the other, and also goes about in small flocks.

Solid-billed Hornbill. — The most remarkable and aberrant genus containing the single Solid-billed or Helmeted Hornbill (*Rhinoplax vigil*) has already been mentioned. It is a very large bird, nearly five and a half feet in length, of which, however, some thirty-four inches is taken up by the greatly elongated central pair of tail-feathers. It has a nearly straight, sharp-pointed bill of moderate length, while the casque is high, flat at the sides, rounded above and squarely cut off in front, all the front part being solid. The whole chin and throat, as well as the neck all around and the middle of the back, are naked. In the male the central pair of tail-feathers are twice as long as the others, though curiously enough it is rare to find a specimen in which both these elongated feathers are present; the sexes are alike in plumage. The general color is brown above and white beneath, with the outside of the wings black tipped with white, and the tail with the central pair of feathers whitish brown and the others white, all being black-banded near the tips. The anterior half of the bill and the front of the casque are yellow, while the remainder of the casque and the basal portion of the bill are crimson; the iris is dark red, and the bare portions together with the legs and feet as well as the skin beneath the feathers is dull, deep red in the male and reddish lilac or blue in the female. This species inhabits the Malay Peninsula, as well as Sumatra and Borneo, being a shy bird of the highest forest trees, where it is usually seen in pairs seeking its food of fruits, for which it never descends to the ground. It has a weak flight but a very powerful note, which can be heard for a distance of a mile or more. "It begins with a series of whoops, uttered at intervals that gradually grow less, after ten or a dozen quick repetitions, and ends in a harsh cackling laugh." It is always killed, whenever opportunity offers, for its curious, highly prized bill, which is carved by the natives into

love charms. Little or nothing is known of its habits of nidification or the uses to which it puts its heavy casque, though according to Dr. Abbott it may be that the latter is for the purpose of giving force to its bill in breaking nuts or something of the kind.

THE HOOPOES

(Family *Upupidæ*)

As pointed out in the introductory remarks under the last family, these interesting little birds appear to find their closest relatives among the curious Hornbills, much as they at first sight seem to differ from them. They are divided into two subfamilies, the true Hoopoes (*Upupinæ*) and the so-called Wood Hoopoes (*Irrisorinæ*) together constituting a very well marked group.

The True Hoopoes (Subfamily *Upupinæ*). — These pretty and graceful little birds, which take their common name from their peculiar call, are all comprised in a single genus (*Upupa*) and seven species, and are entirely of Old World distribution, ranging over the more open portions of much of the temperate and tropical parts of Europe, Asia, and Africa. They are between ten and a half and twelve inches in length, and have a long, slender bill which is curved downward from the base; the tongue, however, is very short. The most marked external feature is a splendid erectile crest, of which the hinder feathers are the longer, which occupies the median line of the crown from the very base of the bill backward. Of other features it may be mentioned that they possess a short, Lark-like tarsus, short, rounded wings with ten primaries, and a moderately long, square tail of ten feathers.

The typical and best-known species — the Hoopoe *par excellence* (*U. epops*) — is found in summer in Europe and northern and central Asia, whence it ranges in winter into northern Africa and northwestern India. The following rather full description is mostly from Blanford: Crest rufous-fawn, all the feathers with black tips, and on the longest feathers the rufous passes into pure white before the black end is reached; sides of head, chin, neck all round, and breast varying from sandy to pale rufous with a vinous tinge; upper back and wings along forearm light brown, then a black band, followed by a buffy white one, crosses the wings and back, with a second black and a second white band on the wings, but the lower back is black or brown; the rump white; upper tail-coverts black, and the tail black with a white bar across it halfway down; quills black, the first primary usually with a white spot on the inner web, the other primaries with a white band across them, while the secondaries have white bases and four white bands, and the abdomen is white with dark brown streaks in front; the bill is dark brown, pinkish at base, and the feet and legs plumbeous.

When not molested the Hoopoes are very tame, familiar birds, frequenting chiefly the open country in either cultivated or waste places, and keeping mostly on the ground, although they can and occasionally do perch. They feed on grubs and insects, which they largely secure by probing in the ground with their long, slender bills. Although such beautiful birds, their nesting habits are such

Fig. 158. — Madagascar Hoopoo, *Upupa marginata*.

as to make them at this time anything but attractive. They select a cavity, preferably in a tree, but occasionally in fissures in rocks or the sides of banks or walls, this being rather slightly lined with grass, feathers, or hair. In China they have been known to nest in holes in exposed Chinese coffins, whence they are called there Coffin-birds. The female sits very closely and is fed by the male, and as the droppings are not removed by the old birds the nest soon becomes very unsanitary and ill-smelling. The eggs, from five to seven in number, are at first a pale greenish blue, but soon become stained and discolored to a dirty yellowish color. The period of incubation is about sixteen days, and, says Swinhoe: "The young, when hatched, are naked, but soon get covered with small blue quills, which yield the feathers. The little creature has a short bill and crouches forward, making a hissing noise. It looks a strange compound of the young Wryneck and Kingfisher. They do not stand upright till nearly fledged. Their crests develop at once, but their bills do not acquire their full length till the following year." This Hoopoe was formerly not a rare visitor to the southern shores of the British Islands, but senseless persecution has finally driven them away almost entirely. Very similar to this but having a narrower band across the tail, is the Madagascar Hoopoe (*U. marginata*), Fig. 158.

In the Indian peninsula, Ceylon, and the Indo-Chinese countries the place is taken by the closely allied Indian Hoopoe (*U. indica*), which differs in absence of white on the crest and a more rufous tinge to the head, neck, back, and breast; its habits are similar to those of the European species.

The only other species we may mention is the South African Hoopoe (*U. africana*), which is distinguished at once by its small size, being only ten inches long, entirely black quills, deep rufous coloration, and absence of white in the crest. It is generally a shy, wary bird in most parts of its range, and is more or less migratory, Mr. Andersson stating that in Damara Land it becomes abundant during the wet season, but gradually disappears with the return of the hot weather. "When it first arrives in Damara Land it is seen in straggling flocks, which soon, more or less, disperse; yet a number of individuals are often found in close proximity, leading a person unacquainted with the habits of the bird to believe that it is really gregarious; it is, however, most frequently found singly. This species to some extent seeks its food (which consists of insects) upon the ground; but, like the Bee-eaters, it will also watch for and pounce upon its prey from some commanding height. Besides frequenting the ground in search of food, it also loves to dust itself in the sand. When in a state of rest the crest of this bird is generally recumbent, but on the least excitement it is alternately elevated and depressed, not rapidly, but in a graceful manner, with deliberation and ease."

The **Wood Hoopoes** (Subfamily *Irrisorinæ*) to the number of sixteen or eighteen forms, disposed among three genera, are all confined to the continent of Africa, and are distinguished from the true Hoopoes mainly by the elongated instead of round nostrils, a long cuneate tail which much exceeds the wings in length, and the more or less glossy plumage. The three genera are based on rather minor differences in curvature of the bill and the overhanging edge of the nostrils. The Wood Hoopoes, as the name implies,

are birds of the wooded districts, spending their entire time in trees and rarely if ever coming to the ground to seek for their food. They are very shy, wary birds, flitting incessantly about among the branches in quest of insects, or climbing about the trunks after the manner of Woodpeckers, and prying into every crack and crevice for eggs and larvæ of insects as well as the various bark-haunting species. Their nesting habits are similar to those of the Hoopoes, and the nest cavity is said to be in the same ill-smelling condition,—in fact, the birds themselves are described by Mr. Ayres as having a peculiarly powerful and disagreeable smell. The eggs of some of the species at least are said to be white. The birds go about in small, often evidently family parties, and have a harsh, resounding cry, whence one or more are known to the Dutch under the name of *Kackela* or *Chatterer*.

The Purple-tailed Wood Hoopoe (*Irrisor viridis*) may be selected as an example of the first genus. About fourteen and a half inches long, the upper surface is a glossy metallic green, shaded with bronze on the back, and steel-blue on the crown and nape, while the wings are steel-blue, the primaries with a middle band of white and their coverts white-tipped; the tail is purplish with violet reflections, the middle pair of feathers unspotted and the others with a subterminal band of white; the under parts are glossy metallic green. In Northeast Africa and West Africa this species is replaced by a closely allied form (*I. erythrorhynchus*) which differs mainly in having a steel-green tail which shows scarcely any violet or purple reflections.

In the Straight-billed Wood Hoopoes (*Scoptelus*) the bill is generally much less curved than in the others, while in the Scimitar-billed Wood Hoopoes (*Rhinopomastus*) the bill is very much curved. In all the plumage is more or less steel-blue or purple.

THE OWLS

(Suborder *Striges*)

The Owls were formerly, and indeed by some authorities are still, regarded as being most closely related to the diurnal birds of prey, or to the Hawks and Eagles (*Accipitres*), the two, it is assumed, constituting groups of coördinate rank, but the conviction has been growing of late years that the Owls are entitled to a higher rank and that their relationship is rather with certain "Picarian" groups, especially with the Goatsuckers. Beyond the fact of their raptorial habits and the shape of their bills and feet, which have largely resulted from these habits, there is really very little to be said regarding the kinship between the Owls and the Hawks and Eagles, and it is held that they could not have been derived from a common stock. For instance, the ambiens muscle, which is regarded as of high taxonomic importance, is present in all *Accipitres* and absent in all Owls, and Gadow, whom we are largely following, urges the impossibility of the Owls once possessing and subsequently losing this muscle. Other anatomical differences are the basipterygoid processes, present in all Owls and absent in all *Accipitres* except in the American Vultures and the Secretary-Bird, which

resemble the Owls least of all members of that group; the cæca, well developed in the Owls and rudimentary in the *Accipitres;* the oil-gland, nude or practically so in Owls and tufted in the Hawks and Eagles; and finally the aftershaft, which is present in all *Accipitres* except the Ospreys, and absent in Owls, except a very minute one in certain Barn Owls. In these characters, however, they agree with the *Coraciiformes* and are here regarded as a suborder of that group, and placed next the Goatsuckers (*Caprimulgi*), all, it is assumed, having arisen from a common ancestral stock.

Structure. — The Owls constitute a very natural assemblage of birds and one about the limits of which there is no doubt, since there are but one or two slightly aberrant forms the world over. They are practically cosmopolitan in distribution, ranging from the Arctic regions to the far islands of the sea, some being confined to small islands or equally limited continental areas. They are so well known that an extended description is hardly necessary, yet it may be said that they are birds with compact bodies, short, rather thin necks, very large, rounded heads, and rather short but strong legs and feet, the latter with four toes, of which two are directed forward and two backward, although in most species the fourth toe is reversible and may be directed either way at will. The toes are armed with strong, sharp claws. The bill is strong but relatively short, with the upper mandible strongly curved and the tip turned strongly downward. The bill is provided with a cere through which the nostrils open, but the latter are usually covered by a series of stiff bristles. The most marked feature is the "Owl-face" so called, due to the large eyes, which are directed forward and are capable of but limited motion, and to the radiating disk of feathers surrounding the eyes. Aside from the great size the eyes are peculiar in other ways, being provided, for instance, with eyelashes, a rare thing in birds, while in closing the eyes the "upper lid is principally effective, the reverse of what is true in most birds." The so-called third eyelid or nictitating membrane is very conspicuous, especially when drawn over the eyes to exclude the bright sunlight. Many Owls are provided with tufts or crests of feathers above the eyes, producing the so-called horns or ears, although it is perhaps unnecessary to state they have no connection with the true ears, which are usually large and not infrequently furnished with a protecting lid or operculum. These ear-tufts, which at least in some cases may be raised or deflected at will, probably serve merely as ornaments. In certain species there is a curious asymmetry of the skull in the vicinity of the ear. The wings are long or moderately so, and usually very broad and rounded; they are comprised of eleven primaries and eleven to eighteen secondaries. The tail is composed of twelve feathers and is usually short and somewhat rounded.

Plumage. — The plumage of most Owls is soft and fluffy, thus often giving an exaggerated impression of the real size, and the colors, as might be expected from their nocturnal habits, are never bright, but consist of a blending or mottling of somber hues. In seeking their prey at night it is necessary that they approach noiselessly, and this end is accomplished admirably by the softness of the plumage, while the mottled colors render them inconspicuous. In such, however, as are

more or less abroad in daylight, as the Hawk-Owls and the Snowy Owls of the Arctic regions, the plumage is less soft and the facial disks less fully developed.

Food. — The food of the Owls consists of various small mammals, such as rats, mice, shrews, squirrels, gophers, rabbits, etc., small birds, an occasional game bird or hen, fish, grasshoppers, crickets, and other large insects. Most of them require large quantities of food, and as their prey is mainly noxious they accomplish an immense amount of good and are deserving of careful protection at the hands of man. The indigestible portions of their food, such as bones, hair, feathers, etc., are discarded in the form of pellets, which may always be found near their nests or roosting places and furnish an excellent index to the nature of their food. Dr. A. K. Fisher examined two hundred of the pellets cast up by a pair of American Barn Owls found nesting in one of the towers of the Smithsonian Institution, and found them to contain 454 skulls, of which 225 were meadow mice, 179 house mice, 20 rats, 20 shrews, and but 1 bird, — a Vesper Sparrow. A German observer examined 703 pellets ejected by the European Barn Owl, and found a total of 2551 skulls, of which 16 were bats, 3 rats, 930 mice, 1579 shrews, 1 mole, 19 English Sparrows, and 3 other birds. The manner in which the prey is secured varies somewhat. Insects are sometimes taken on the wing, but frequently they quarter back and forth after the manner of a Harrier, and strike with a quick pounce, transfixing the victim with their sharp claws. The smaller animals are frequently swallowed whole, while the larger are carried in their claws to a convenient resting place, where they are torn in pieces or sometimes skilfully plucked.

Nests and Eggs. — The nests of Owls are usually rather rude affairs, placed in hollow trunks or limbs of trees, old abandoned or neglected buildings, the discarded nests of other large birds, rocky shelves or caverns, occasionally on the ground, and by some species in underground burrows. The eggs are usually nearly spherical in shape and white, — either pure white or slightly tinted with yellowish or blue. They vary in number from two in some species to as many as ten or twelve in others, the usual number being three or four. Ordinarily Owls nest very early in the season, often when the ground is still covered with snow, and as a result incubation commences as soon as the first egg is deposited, it being a common occurrence to find both fresh and heavily incubated eggs in the same nest, or newly hatched and half-fledged young. They are usually close sitters, both sexes taking part in incubating the eggs, and not infrequently they defend their treasures with much spirit. The young are perfectly helpless when hatched and are covered with a soft down; they remain for a considerable time in the nest.

Notes. — While the vocal apparatus is fairly well developed in Owls, their notes are usually anything but attractive or pleasing, being a loud "hoot," a howling or screeching, or a weird imitation of human laughter; in a few cases, however, the voice is low and muffled, or even somewhat clear and musical.

Color Phases. — Among the Owls, as in certain other groups of birds, the female is usually the larger, but as will be shown later, there are some excep-

tions. In all cases, however, the sexes are alike in plumage, and in this connection it may be mentioned that two phases of plumage often occur irrespective of age or sex, namely, a "gray" phase in which the dominant color is brownish gray, and a "red" phase in which a rusty red predominates.

The Owls, which are embraced in some thirty genera and considerably more than three hundred species and subspecies, are unquestionably a very old group, since a dozen or more fossil forms have been described from the lower, middle, and upper Tertiary deposits of various parts of the world. As already pointed out, they are a very compact and homogeneous assemblage, so much so in fact that it is difficult to satisfactorily divide them into smaller groups. As at present understood, the suborder contains but a single family (*Strigidæ*), which it is possible to divide into two well-marked subfamilies, — the *Striginæ*, or Barn Owls, and the *Buboninæ*, or Horned Owls and their allies.

The Barn Owls (Subfamily *Striginæ*). — This subfamily includes, so far as known, but one living genus, *Strix*, embracing the well-known Barn Owls. Among the characters by which this subfamily is distinguished it may be mentioned that the sternum or breast-bone is without notches behind and has its broad keel firmly joined to the furcula; the inner toe is as long as the middle toe, the latter with the inner edge of the claw serrated. The wing-quills also furnish a number of distinguishing marks, the first being longer than the third, and all without sinuation or indentation on the inner webs.

The **Barn Owls**, of which some twenty-five forms are known, enjoy a wide distribution, having representatives in nearly all parts of the world with the exception of the colder regions. They are medium-sized birds, none of them exceeding twenty-one inches in length, without ear-tufts, but with a very conspicuous, entirely continuous facial ruff, which gives them the so-called "monkey-face," so often ascribed to them. The wings are very long, extending considerably beyond the tip of the relatively short tail, the legs are densely clothed with soft, short feathers, and the claws are extremely long and sharp. The beak is rather long, straight at the base and strongly decurved at the tip, while the eyes are small and black.

There are some differences of opinion as to the treatment of these Owls, some arguing that there is but a single, or at most only three or four, forms that are entitled to rank as species, and these of very wide distribution; but, as will be shown later, the differences in size and coloration are so great as to seemingly preclude the possibility of there being so few recognizable forms. Thus the American Barn Owl (*Strix pratincola*) is from fifteen to twenty-one inches in length, ochraceous yellow above, this overlaid, more or less continuously, by a grayish superficial hue, finely mottled and speckled with dusky and white, while the lower parts vary in every degree from silky white to bright tawny, dotted or speckled with black. It is pretty generally distributed over the warmer parts of the United States and Mexico, becoming the most abundant Owl in California; but as it is strictly nocturnal in its habits its presence is often unnoticed even in localities where it is fairly common. It has a special predilection for church towers, open belfries, or little-frequented buildings when these are

Fig. 159. — American Barn Owl, *Strix pratincola*.

available, but in the western part of the country it more frequently selects cavities in the sides of gullies and rocky cliffs and occasionally makes use of hollow stubs and trees. The nest proper, if it may be so called, consists of a few feathers or more frequently of such rubbish as collects in the vicinity. The eggs generally number from four to seven, but as many as ten or eleven have been reported in a single nest. "The period of incubation is from three to three and a half

weeks, and as a bird will occasionally begin to set soon after the first egg is deposited and as eggs are laid on alternate days, the last one may not hatch until two weeks after the first." Both parents assist in duties of incubation.

Although the Barn Owl is one of the most distinctly nocturnal of any of its tribe, it can see perfectly well in the brightest daylight if it is, for any reason, required to leave its retreat. It usually sleeps during the day, sitting upright in some dark corner, but as twilight comes on it emerges from its seclusion and hurries on silent wings to the hunting grounds, which are usually low meadows, prairies, or marsh lands, where its favorite prey abounds. In the eastern part of the United States its food consists principally of mice and rats, while in the South it subsists largely on the cotton rat and in the Pacific States on the gopher and California ground squirrel, all, but especially the latter, being very destructive to many growing crops. The numbers of these noxious animals that are destroyed by a single pair of birds is truly astonishing. Lord Lilford, speaking of the European species, states that he has seen a pair of Barn Owls bring food to their nest no less than seventeen times within half an hour, and Streator, writing of the Barn Owls in California, states that he has found "a deposit of pellets of nothing but gopher hair and bones which had been ejected by the Owls, and had accumulated to the extent of two or three cubic feet in the trees in which they lived." The great number of skulls found in these ejected pellets has already been indicated (p. 513), and it seems hardly necessary to urge the protection of these birds on the score of their usefulness.

In the southern parts of the United States this Owl is a resident species, but in the other portions of its range it is migratory, often somewhat gregarious during the winter. It does not appear able to withstand any severe cold and hence it is a rather late breeder, nesting from January or February in the extreme southern districts to April or May in the north. Not infrequently two broods are reared in a season.

The **European Barn Owl** (*S. flammea*), which is held by many to be the principal species of the genus and the type whence has sprung most of the forms spread so widely over the globe, is smaller than the American species, the average length being only fourteen inches. As properly restricted, it is found only in Europe and Africa, and may be described as light tawny yellow above, with lower plumage white. In this, as in the American Barn Owl, there is a light and a dark phase of plumage, the former being white, the latter tawny, below. As its habits are practically the same as those of its American cousin, it is not necessary to recount them at length. Its note is described by Dresser as "a loud, harsh, weird shriek, and both the old and young birds utter a deep snoring sound." Its food consists of rats, mice, moles, large insects, small birds, occasionally also of fish, but principally of mice.

Owls (Subfamily *Buboninæ*).—All the remaining Owls, whatever their size, plumage, habits, or geographical distribution, are included within the limits of the second subfamily, and the difficulty of finding a satisfactory collective name for such a miscellaneous assemblage is not, perhaps, to be wondered at; without great violence to the facts, however, they may receive the gen-

eral designation given above. The characters which serve to separate them are, if it is permissible to use the expression, mainly the reverse of those which marked the first subfamily, viz., the breast-bone is provided with notches on its lower border; the inner toe is decidedly shorter than the middle one, the claw of which is without serrations on its inner edge, while the first quill is shorter than the third, and from one to six of the quills have their inner webs sinuated.

The attempt has been made to divide this subfamily up into a number of groups, which have been called subfamilies, the whole group being dignified by family rank, but the venture has not been very successful. However, it may be well enough to follow the sequence of these so-called subfamilies, bearing in mind that they do not rest on very ample or secure foundations.

The first of these (*Asioninæ*) includes the Long-eared and Short-eared Owls, which to the number of a dozen or more forms are comprised in the genus *Asio*. They are birds of medium size with a relatively small head and small eyes, well-developed or rudimentary ear-tufts, and a very large ear-conch which is unsymmetrical on the opposite sides of the head; the bill is rather weak and compressed, with the cere much arched, while the tail is about half the length of the wing and rounded, and only the first, or first and second, outer primary has the inner web emarginated.

European Long-eared Owl. — The oldest and in some respects best-known species is the European Long-eared Owl (*A. otus*), a bird about fourteen inches in length, which ranges over Europe generally, Asia as far east as Japan and China, and south to northern Africa and northwestern India. It is a beautifully mottled bird, the upper parts being a blackish brown, finely mottled with brown and gray and streaked with dark brown. The facial disk is a warm buff, with grayish black margin and outer rim. The lower parts are a warm buff and gray with blackish streaks and minute transverse bars, while the tail is ochreous barred and slightly vermiculated with brown. The bill and claws are dark horn-color and the iris orange-yellow.

The Long-eared Owl is a resident species throughout the larger part of its range, although to the eastward it becomes somewhat migratory. It shuns habitations and ruins and frequents wooded districts, spending the day among the dense branches of some evergreen tree with its slim body pressed against the larger limbs and at such times is almost invisible. That it can see in the daytime, however, is attested by some observers who have seen it "sailing quietly along, as if hawking, on a bright sunny day." But it is mainly nocturnal, becoming active at dusk and remaining so during the entire night, returning at dawn to its seclusion in the dense trees. Quite unlike most Owls, it is more or less gregarious, as many as a dozen or fifteen being often found in company. On this point Mr. Abel Chapman says: "As soon as the young are fledged the whole of the Owls associated together, perhaps three or four broods, old and young in a single family, choose a thick black fir for their abode. Here they all passed the day. To this particular tree the whole of the Owl-life of these woods resorted regularly at dawn, and in it slept away the hours of daylight, hidden amongst

the deep evergreen recesses. Toward dusk their awakening was manifested by the querulous cat-like cry; ten minutes later their silent forms appeared outside the wood, and after a few rounds of preliminary gyrations it was dark enough to commence operations in earnest." They are rather silent birds, except possibly when young, the commonest note being a mewing cry, heard when the birds begin to arouse themselves from the daytime sleep; occasionally they emit a short, barking cry. The food consists principally of field mice and rats, but it also preys on large insects, small birds, an occasional young hare or rabbit, and sometimes frogs. It nests in wooded districts, usually taking possession of the abandoned nest of a Crow, Magpie, or Heron, or even a squirrel's dray, in which it deposits from four to six nearly round, smooth white eggs.

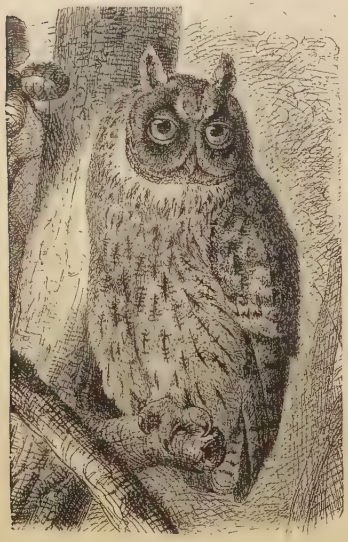


FIG. 160. — American Long-eared Owl, *Asio wilsonianus*.

American Long-eared Owl. — Very closely related, and indeed by some regarded as only a geographic form or subspecies, is the American Long-eared Owl (*A. wilsonianus*), which differs mainly in being darker, with the dusky of the upper parts in the form of a confused mottling which is not conspicuously contrasted with the paler ground color. The lower parts incline to be lighter, marked with irregular dusky bars rather than broad stripes. This is a widely distributed species, ranging over the whole of temperate North America south to the tablelands of Mexico, and is strictly nocturnal in its habits, spending the day in seclusion and coming forth only at dusk. It is so very quiet in its ways that its presence is often unknown even where it is really quite abundant. Its habits are very like those of its relatives across the water; for instance, it is more or less gregarious, as Major Bendire speaks of seeing fifteen in a single mesquite bush, and it appropriates an old nest of bird or mammal for its home. Its food consists largely of mice, squirrels, gophers, and chipmunks, with an occasional small bird or rabbit, and on the whole it is regarded as eminently beneficial.

Stygian Owl. — Of the several other species of this genus which are remarkable for the very long ear-tufts we may only mention the Stygian Owl (*A. stygius*), a bird of eastern tropical America, ranging north to eastern Mexico and Cuba. It is about twenty inches long, dusky above with a sparse mottling of yellowish white and grayish white below, coarsely barred and irregularly striped with dusky. It is further distinguished by having the toes naked and the ends of the longer wing-quills much narrowed.

Short-eared Owls. — Of the second section of the genus which is characterized by having the ear-tufts rudimentary, the so-called Short eared Owl (*A. accipitrinus*) is the typical representative. This species is practically cosmopolitan, ranging throughout the entire Western Hemisphere except the Galapagos Islands and a part of the West Indies, and the Eastern Hemisphere excepting Australia and Oceanica. Ranging in length from fourteen to nearly seventeen inches, it has the ground color both above and below varying from bright tawny ochraceous to buffy white, which is striped but not barred with dark brown. The face is whitish, becoming blackish around the eyes, while the ear-tufts are so reduced that at a distance of twenty-five feet they are practically indistinguishable.

"In its general habits," says Bendire, "the Short-eared Owl differs considerably from most of the other members of this family found with us in being not nearly so nocturnal and in frequenting the more open country; for while most of our Owls inhabit timbered regions, this species shuns such sections and rarely ever alights on a tree. Its home is amidst the rank grasses and weeds usually found along the borders of lakes and sloughs in the open prairie country, where it hides during bright, sunshiny days. If the sky is clouded, this Owl may be frequently seen hunting in the early morning or evening and sometimes in the middle of the day, and at such times it flies very low, not more than a few feet from the ground, which it carefully scans for its humble prey. Its flight is remarkably easy, graceful, and perfectly noiseless." From the fact that these birds are usually seen in pairs it is presumed that they remain mated through life. Their notes are apparently somewhat varied, consisting of a faint mouse-like squeak, a loud, startled cry, like a ghostly laugh, and a hoot which has been likened to the "baying of a dog in the distance." Their food consists almost entirely of small rodents, such as meadow mice, gophers, voles, lemmings, with an occasional small bird, as well as grasshoppers and various insects. Whenever a district becomes overrun with certain of these rodents, such as field mice and voles, the Short-eared Owls are almost certain to assemble in numbers and to remain until the vermin are reduced. This species is also distinctly migratory, breeding most abundantly in the northern portions of its range and retiring southward in fall. In the Arctic regions the time of nesting may be deferred until June or even July, but in the more southern portions it may begin as early as March. The nest is always placed on the ground, usually in a bunch of grass or weeds, and consists of a slight hollow sparsely lined with dry grass; occasionally, according to Dr. Dall, the nest may be placed in a burrow on the side of a steep bank. The eggs number from four to seven, rarely more, and usually but a single brood is reared in a season. When disturbed the birds submit with little demonstration.

In Porto Rico the place of the typical form is taken by a distinct species, the Porto Rican Short-eared Owl (*A. portoricensis*), which has the dorsal region a nearly uniform dark brown instead of being conspicuously striped with ochraceous, while in the Galapagos Islands there is another closely related species (*A. galapagoensis*). The latter has the legs marked with dusky streaks, the back

irregularly barred or transversely spotted with fulvous, and the under parts barred as well as striped. Their habits are similar to those of the common species. The only other species that we may mention is the African Short-eared Owl (*A. nisuella*), which is a handsome bird, reddish brown above and pale yellow ochre, barred with brown on the body and legs. This species frequents swamps and marshy places, remaining concealed during the day amongst long grasses and weeds, going abroad at night to prey upon the water insects, mice, and lizards. The nest is placed on the ground, usually under a clump of grass or rushes, and the eggs are only two or three in number.

Fig. 161. — Pel's Fish Owl, *Scotopelia peli*.

Fish Owls. — The Fish Owls so-called constitute quite a distinct group (*Ketupinæ*), distinguished by the fact that the tarsus is generally naked and granular and the soles of the feet covered with prickly scales, much as in the Ospreys. They are comprised in two genera, one of which (*Ketupa*) is confined to the Oriental region, from Palestine to the Indian peninsula, Malayan peninsula, and China, and is provided with large ear-tufts, while the other (*Scotopelia*) is exclusively African and is marked by the absence of ear-tufts.

The **Oriental Fish Owls** (*Ketupa*) are large, powerful birds, with large, well-curved and sharp-edged claws and large, strong bills. The wings are rounded and do not reach to the end of the moderately long tail, while the facial disk is poorly marked, especially above. Of the four recognized species the Indian or Brown Fish Owl (*K. zeylonensis*) is, perhaps, the best known. It is a large bird, nearly twenty-five inches in length, rufescent brown or dull rufous above, the feathers streaked with black down their centers and more or less mottled with fulvous on the webs, the quills and tail-feathers dark brown with paler mottled whitish brown bands, while the throat and lower parts are whitish, narrowly barred with brownish rufous, each feather with a dark shaft line. This species, which is common throughout India, Ceylon, and Burma, frequents well-wooded regions near the sea, rivers, or large bodies of water, generally passing the day

in a thick tree, whence it issues at sunset and wings its way to the water's edge to search for food. It lives principally on fish and crabs, but is also known to kill small birds or mammals. At the nesting season, which extends from December to March, it resorts to the vicinity of water, placing the nest in a hollow tree, the abandoned nest of the Fishing Eagle, or on a rocky ledge. The eggs, usually two in number, are white and broad oval in shape. The Tawny Fish Owl (*K. flavipes*) is a fine species, frequenting the banks of Himalayan rivers, and is rich orange-buff, the feathers all with dark central stripes. Its nest and eggs are unknown. Similar to the last, but much smaller, is the Malayan Fish Owl (*K. ketupa*), which ranges throughout the Malay Peninsula, Java, Sumatra, and Borneo. It feeds largely on insects and is said to be more or less active during daylight.

The **African Fish Owls** (*Scotopelia*) also number four species, all being large, handsome, though apparently rare, birds. Pel's Owl (*S. peli*) of both East and West Africa is the best known. It is about twenty-four inches long, a deep rufous-bay above, numerously barred with black, and light bay below, with distinct heart-shaped bars of black. In the Zambesi district it is said to feed largely on the wild Guinea Fowl, while in West Africa it has been observed to feed on fish.

Horned or Eagle Owls. — The splendid Horned or Eagle Owls (*Bubo*) are typical of the largest of the groups (*Buboninæ*) into which the members of this subfamily are divided. They range in size from medium to very large, in fact among them are about the largest and most formidable representatives of the suborder. They have a large head with conspicuously long ear-tufts and fully feathered tarsi, while the toes are sometimes bare or scantily feathered. The wings are relatively short, always falling short of the rounded tail by the length of the middle toe; the bill is short but very strong, and the claws are powerful and well curved, the inner being the longer. The plumage is irregularly varied with buffy, tawny, or whitish and dusky in variable extent.

Great Horned Owl. — The genus *Bubo* is a large one, embracing not less than twenty-five or thirty forms, and is pretty generally distributed throughout the world, excepting Australia. They are subject to a considerable amount of local variation, which has given rise to a number of well-marked geographical races. The typical form, the Great Horned Owl *par excellence* (*B. virginianus*), is a splendid bird between eighteen and twenty-five inches in length, with the plumage moderately dark-colored, the dusky markings more extensive or more numerous, while the face is usually more or less rusty. It is found throughout eastern North America, ranging south to eastern Mexico. It frequents especially the heavily timbered districts, and so long as these conditions prevail it is a fairly common species, but with the leveling of the forests, the usual accompaniment of civilization, it has become rarer. It is an unsociable and solitary bird, except during the breeding season, and rarely allows another of the same species to remain in the vicinity of its range. "In disposition," says Dr. Fisher, "it is fierce and untamable, and in point of strength and courage is inferior to none of our rapacious birds. It is so savage and seemingly so devoid of the confidence

Fig. 162. — Great Horned Owl, *Bubo virginianus*.

usually shown by birds of prey kept in confinement that it is with the greatest difficulty that it can be tamed even when taken young from the nest. It is morose and sullen, lacks affection for its keepers, and will often fly viciously at any one who attempts to handle it or enter the apartment in which it is confined." While it is mainly nocturnal in its habits it can see well in daylight, and may often be seen flying on dark cloudy days, and during the nesting season probably hunts day or night indifferently. It is the most powerful and voracious of

our Owls, its great size and fierce disposition making it a veritable tiger among birds. Its food is of great variety, consisting of birds, mammals, reptiles, fish, crustaceans, and insects. Among the birds most frequently taken may be mentioned all kinds of poultry, Grouse, Quail, Doves, Wild Ducks, and even Hawks, Crows, and other Owls fall its victims. Dr. P. R. Hoy, of Racine, Wisconsin, received a Great Horned Owl which he placed in a large enclosure containing a Bald Eagle. The next morning the eagle was dead, having been despatched by the Owl during the night. Among mammals, hares, rabbits, squirrels, skunks, opossums, and small rodents help to fill out its bill of fare. Wherever food is plenty it often contents itself with simply eating the heads of its victims, and thus wipes out whole families of birds in a night. Dr. C. Hart Merriam states that one of these Owls has been known to decapitate three Turkeys and several chickens in a single night, leaving their bodies uninjured and fit for the table. These voracious habits make them detested by poultry raisers and sportsmen, and no opportunity is neglected to destroy them; but as the depredations are committed at night it is not always easy to capture them. Of the hundred and twenty-seven stomachs examined by Dr. Fisher thirty-one contained poultry or game birds; thirteen, mice; sixty-five, other mammals; one, fish; ten, insects; and seventeen were empty.

The Great Horned Owl is a resident wherever found and is one of the earliest breeders among the birds, the mating season beginning in midwinter while the ground is still covered with snow and ice. Whenever possible a hollow tree is selected for the nesting site, but when this is unavailable the old nest of a Hawk or Crow may be taken, and in exceptional instances they may construct their own nest, or place the eggs on a ledge of rock or the ground. They are devoted and courageous in the defense of their nests and young, and more than one would-be despoiler has been forced to beat a hasty retreat to keep out of reach of the sharp and powerful talons. The eggs are usually two or three in number and about 2.20 by 1.80 inches in size. To show that the young are well provided for, we may quote from a description of the food found in a nest which contained two young Owls: "A mouse, a young muskrat, two eels, four bullheads, a woodchuck, four Ruffed Grouse, one rabbit, and eleven rats, in all weighing about eighteen pounds." The common call which is most frequently uttered is a deep-toned *whoo, hoo, hoo, hoo, whooo, whooo.* "Aside from these, they have several others, one a cat-like squeal or cry like *waah-hee*, and again a series of yelps, similar to the barking of a dog."

Other American Horned Owls. — Of the several geographical races the Western Horned Owl (*B. v. pallescens*) is similar but much lighter in color, the buff markings being largely replaced by gray or white and the darker ones less dusky and of less extent; it is found in the western United States except on the northwest coast, where it is replaced by the Dusky Horned Owl (*B. v. saturatus*), which is an extremely dark-colored race, the prevailing color being fuscous or dusky. The Arctic Horned Owl (*B. v. subarcticus*) is still lighter colored, the prevailing aspect being white and the dark markings being very much reduced in extent. Lower California is the home of a small race known as the Dwarf

Horned Owl (*B. v. clachistus*), which Brewster describes as being similar to the dusky form (*saturatus*), but very much smaller. It is common everywhere from the coast to the top of the highest mountains.

European Eagle Owl. — Of the Old World species we may mention the so-called Eagle Owl (*B. bubo*), a bird twenty-six inches or more in length, which is found throughout Europe generally, from the Arctic to the Mediterranean. The plumage is reddish ochreous or reddish brown above, marked and mottled with black, and brownish ochreous barred with black below. "It is one of the boldest of European birds of prey," says Dresser, "and very destructive to game, but it does not disdain rats, mice, hares, rabbits, Crows, etc. It frequents forests and rocky localities and is nocturnal in its habits, though not dazed by the sunlight when disturbed by day. Its cry is a loud, deep *hee, hee*, modulated in various ways. It nests in the rocks, on the ground, or in the forests will utilize the nest of one of the larger birds of prey." The eggs, from two to three or four in number, are deposited from March to May, according to latitude. East of the Ural Mountains the place is taken by a very light colored form (*B. sibiricus*) and in the deserts of southwestern Siberia, Tibet, and the Himalayas by a smaller, more barred form (*B. turcomanus*).

Rock Eagle Owls. — The Indian peninsula is the home of the Rock Eagle Owl (*B. bengalensis*), which is distinguished from those just mentioned by having the toes bare. It frequents rocky hills and ravines, alluvial cliffs and brushwood, besides rivers and streams, and subsists on rats, mice, birds, lizards, snakes, crabs, etc. Its eggs, two to four in number, are laid on a rocky ledge, in a cave, or on the ground. The only Japanese species is the Japanese Eagle Owl (*B. blakistoni*) [This bird I consider to represent a very distinct genus and is the most powerful of all Owls, bearing to others the same relation that the Harpy does to other Eagles. — R. R.], while a paler and whiter race of this (*B. dærriesi*) is found in eastern Siberia, and a larger, duller-colored species (*B. coromandus*) in India and China.

African Eagle Owls. — The African continent is especially rich in these great Owls, not less than ten forms of *Bubo* being known, as well as two or three that have been separated under the name of *Huhua*, on the ground that the young have a perfectly distinct plumage, moulting from the immature into the adult garb. Two species of this latter genus are found in the Oriental region, the large Forest Eagle Owl (*H. nipalensis*), a shy, forest-haunting bird, and the Malay Eagle Owl (*H. orientalis*), of which nothing is known regarding its habits or nidification.

Snowy Owl. — Passing over an unimportant genus confined to the Philippine Islands, we come to the splendid Snowy Owl (*Nyctea nyctea*), the sole representative of its genus, which is distinguished at once by its large size and snowy plumage, — fittingly emblematic of its Arctic home. It has a comparatively small head, without obvious ear-tufts, while the loral feathers are extremely long and almost conceal the bill, and the claws are nearly hidden by the dense, hair-like feathers covering the toes. The male, which is from twenty to twenty-three inches long, is pure white, sometimes almost immaculate, but usually

marked more or less with slaty brown or dusky, especially on the tips of the feathers. The female is much larger, ranging from twenty-three to twenty-seven inches, and is much darker colored, only the face, fore neck, middle of the breast, and feet being pure white, the remaining portions being heavily barred with dusky. The downy nestling is a uniform dusky brown, or deep sooty grayish, becoming paler on the legs and feet, and is said to moult directly into the mature plumage.

The Snowy Owl is circumpolar in distribution, spending the summer in the high Arctic regions and straggling southward for a greater or less distance in winter. Thus in North America at this season it is rare west of the Rocky Mountains and south of the northern border of the United States, but in the east it is sometimes common as far south as the fortieth parallel, and has been known to reach the southern tier of states, while in the Old World it comes south either regularly or accidentally to the British Islands, Germany, central Asia, and the northwestern Himalayas. It should not, however, be understood that all or even any very considerable portion of these Owls migrate very far south of their Arctic home, for those which enter the United States are but a portion of those which pass the winter near the northern limit of trees. At irregular intervals, and from unknown causes, but presumably from lack of food, there are extensive invasions of this Owl, such, for example, as that during the winter of 1876–1877, when, according to Mr. Ruthven Deane, more than five hundred were seen in New England alone. Another incursion, but of less extent, occurred in the winter of 1892–1893, and a much larger one during 1902–1903, from which it appears that these migrations are separated by intervals of ten or fifteen years.

Fig. 163. — Snowy Owl, *Nyctea nyctea*.

The favorite haunts of the Snowy Owl are the immense moss- and lichen-covered tundras of the boreal regions, where it apparently leads an easy existence during the short Arctic summer. It is mainly diurnal in its habits, but like most birds it is more active in search of its prey during the early morning and again toward evening, and occasionally it may hunt at night. Its favorite attitude is

a commanding position on some projecting point of rock or a knoll in the tundra, where it watches what is going on around it, now and then dropping upon some unsuspecting mouse or enjoying a more or less extended flight over the country. It is shy and difficult of approach at all times, but especially when occupying a commanding position in the open; yet it is of gentle disposition naturally and when caught soon becomes tame in confinement. Its flight, though noiseless, is strong and often protracted, and its cry, according to Dresser, is a loud *krau-krau* and also *rick, rick, rick.*

The food of the Snowy Owl consists principally of the lemming, and it is said to be always abundant wherever this little Arctic mammal is found in numbers. Thus of its presence at Point Barrow, Alaska, Murdoch says: "During the season of 1882 we saw no lemmings, though signs of their presence in the shape of droppings, and their skulls and skeletons in the Owls' castings, were numerous all over the tundra. During that season we saw but few Owls. On the other hand, in 1883, lemmings were exceedingly plenty all around the station, and Owls were proportionately abundant; scarcely a day passed without one or more being seen sitting on the tundra, generally on the top of a bank or small knoll, on the lookout for lemmings." Aside from the lemmings it also feeds on Ptarmigan, Ducks, and other water fowl, and even the Arctic hare, an animal fully twice as heavy as itself, is successfully attacked and killed by it. "This bird never seizes its prey," says Turner, "except while the latter is in motion, except probably in the case of fish. The hares are chased and seized near the lumbar region and held by the bird, which spreads its wings and partly lifts the animal from the ground, thus depriving it of the power to use its strong hinder parts. The natives assert that when a Ptarmigan is sighted, the Owl endeavors to start the bird into a run and it is then seized." The prey is always eaten on the spot, unless, of course, it is designed for the young.

The nest of this Owl is a very simple affair, usually placed on the ground on the highest and driest point in the surrounding tundra, but occasionally on a projecting ledge of rock. When on the ground it is a simple hollow scratched out by the birds and lined with a few grasses and feathers; when on a ledge the eggs frequently lie on the bare rock with just sufficient material to keep them from rolling off. The eggs, which are white with a faintly perceptible creamy tint, number from three to ten, perhaps the usual number being from four to six. Incubation begins as soon as the first one is laid, and young of various sizes or eggs and newly hatched young are frequently found in the same nest. A single brood is reared in the season, and, according to Turner, the old birds are very bold in defense of the nest.

Screech Owls. — Allied to those last considered is a very large and widely distributed genus of Owls known as Screech or Scops Owls (*Megascops*). They are all birds of small size, the majority of them being under ten inches in length, with large heads and prominent ear-tufts, and relatively long wings which reach nearly or quite to the tip of the tail. The tarsi are sometimes entirely naked, and the toes are frequently naked or incompletely feathered. The plumage is exceedingly variegated with vermiculations, cross-bars, and mottlings, and most

of the species, at least in North America, are dichromatic in some part of their range, there being a bright rufous phase which is quite different from the "normal" grayish plumage. This mixing of plumage makes it very difficult to properly differentiate the various forms, and there are decided differences of opinion regarding their limitations. They are mainly nocturnal in their habits, although occasionally seen abroad during the day, and they frequent wooded districts as well as groves and gardens.

American Screech Owls. — Of the eighty or more forms recognized about twenty are confined to the New World and the remainder to the Old World, the two groups being very distinct. The most important North American species is the common Screech Owl (*M. asio*), which in a number of well-marked geographical races is spread over practically the entire continent except at the far North. The forms inhabiting the eastern United States exhibit in a marked degree the dichromatism or gray and rufous phases already mentioned, which have no relation to sex, age, or season, while the western races are monochromatic, the plumage presenting in all individuals essentially the same character and corresponding to the grayish phase of the eastern races. In the typical form (*M. asio*), which ranges over the eastern United States and British provinces west to the edge of the Great Plains, the normal plumage is generally brownish gray above, streaked with black and finely mottled with ochraceous buff, and white, finely streaked and barred with black and rufous on a white ground below. In the rufous phase the upper parts are bright rufous finely streaked with black, while the lower parts are white with the feathers centrally streaked with black and barred with rufous. The length is between eight and ten inches, the female, as usual among Owls, being the larger. It is not uncommon to find young birds of both phases in the same nest, even when the parents are of the same color, and there is a tendency for one or the other phase to predominate in certain localities; in the Mississippi Valley, for instance, the rufous plumage appears to prevail, while near the Atlantic coast the reverse seems to be the case.

The Screech Owl, or as it is sometimes called according to the plumage, the Red or Gray Owl, is strictly nocturnal in its habits, frequenting open wooded districts, old apple orchards, or outbuildings, and spending the daytime in a hollow tree, a dense thicket, or a dark corner of a barn. It is rarely seen during the daytime, unless its retreat is discovered by some prying Blue Jay or other small bird, when it is mobbed unmercifully, and although it may be relatively abundant, its presence, from its retiring disposition, is often unsuspected. But, says Chapman, "how differently they appear when the western sky fades and their day begins! With ear-tufts erected and his great, round eyes opened to the utmost, he is the picture of alertness." Their weird, melancholy call, which has given rise to not a little superstition and dread among ignorant people, is a tremulous, wailing whistle or doleful moan; it is often heard in the early evening about dwellings. Their food consists very largely of mice and other small rodents, as well as insects and an occasional small bird or frog; rarely, and only when pushed by the extreme pangs of hunger, are they known to attack poultry. Of the 255 stomachs examined by Dr. Fisher, only one contained

Fig. 164. — American Screech Owl, *Megascops asio*.

poultry; 38, other birds; 91, mice; 100, insects, while the remainder were divided among lizards, fish, crawfish, spiders, earthworms, etc., or were empty.

This Owl is a constant resident wherever found, not migrating or even wandering far during the winter months. The nesting season extends from the latter part of March to the beginning of May, according to locality, and the site chosen is a hollow tree at no great distance from the ground or a dark recess about a building, never in an open nest in a tree. The eggs generally number four or

five, but as many as seven or eight have been recorded. "Both parents are generally found near the nest, and not infrequently sitting on the eggs at the same time. When suddenly disturbed in their hole they frequently utter a hissing noise and snap their mandibles together, producing a kind of rattling sound."

Of the various geographical races, mention may be made of the Florida Screech Owl (*M. a. floridanus*), which is smaller and much darker than the typical form and has the rufous phase more richly colored. It ranges from South Carolina to Georgia and the whole of Florida, while in southern Texas and eastern Mexico occurs the Texan Screech Owl (*M. a. maccallii*), which is also smaller and slightly darker than *M. asio*, the light mottlings on the upper surface being much coarser and more conspicuous. Of the races which do not exhibit dichromatism, the Arizona Screech Owl (*M. a. cineraceus*) ranges from northwestern Mexico to the contiguous border of the United States; the Californian Screech Owl (*M. a. bendirei*), which is confined to California; Kennicott's Screech Owl (*M. a. kennicottii*) of the northwest coast; and the Rocky Mountain Screech Owl (*M. a. maxwelliæ*) of the higher Rocky Mountains.

Flammulated Screech Owls. — The only other North American species, which is sometimes placed in a separate genus, is the Flammulated Screech Owl (*M. flammeola*), a resident of the elevated plateaus of Guatemala and central Mexico, whence it ranges northward to Colorado and northern California. It is a small species, only about six and a half inches long, and may be known by having the toes entirely naked to the extreme base, and by the rather small ear-tufts. It is a rare bird in the United States, and but little is known of its habits beyond the fact that it nests in deserted Woodpeckers' holes and feeds largely on insects. A smaller and much lighter-colored form (*M. f. idahoensis*) has recently been described from the mountains of central Idaho.

Scops Owl. — There are a number of Screech Owls inhabiting Mexico, Central America, and northern South America, but as little is known of their habits we may pass to a brief consideration of some of the Old World species, one of the best-known being the so-called Scops Owl (*M. scops*) of central and southern Europe, central Asia, and northwestern India. It is about seven and a half inches long, grayish above, varied with orange-rufous and brownish and striped and vermiculated with black, while the wings are barred with white, and the under parts are grayish white, vermiculated, blotched, and striped with brown or brownish black. According to Dresser, "it frequents groves and woods where there is abundant undergrowth, and is especially nocturnal in its habits. It feeds chiefly, if not entirely, on insects of various kinds. Its note, which is uttered constantly at short intervals during the night, is a clear monotonous *he-ou*." The nesting site is usually a hole in a tree, more rarely the deserted nests of other birds or holes in rocks or walls, and the eggs are usually four or five in number. This species passes into a great variety of forms throughout its range and there are numerous more or less well marked species through the Oriental region, with a lesser number in Africa. Their habits so far as known are all similar to those already mentioned.

Hawk Owls. — Passing over a number of small and relatively unimportant genera which were formerly included in that just considered, among them *Lophostrix*, which embraces two rather large South American species, we come to another very large, exclusively Old World genus (*Ninox*), which includes the so-called Hawk Owls, a name which is also and more properly applied to members of the genus *Surnia*. They are mostly small or medium sized Owls of very Hawk-like appearance, owing to the fact that they are without ear-tufts and to the ruff and facial disk being quite obsolete, while the plumage, especially of wings and tail, is rather firmer than is usual among Owls. They have relatively small heads and rather weak bills, with a swollen cere and the nostrils opening close to the front margin. The tail is rather long and rounded, while the wings are long and pointed, with the third and fourth quills longest and the first about equal to the seventh. The short tarsus is feathered and the toes are thinly furnished with bristles. The color of the plumage in a majority of the species is an almost uniform chocolate-brown above.

One of the most widely distributed species is the Hairy or Brown Hawk Owl (*Ninox scutulata*) of the Oriental region, a bird about twelve and a half inches in length, with the plumage a rich chocolate-brown above, the tail boldly barred with blackish, and the under parts chocolate-brown striped with white. It is a bird of the forests, chiefly nocturnal in its habits, keeping mostly to the thick trees during the daytime, and occasionally observed at evening sitting on a stump or limb. It feeds chiefly on insects, but also on mice, lizards, etc., and has a loud, not unmelodious, hoot which is described as *whoo-wuk*, while when wounded it is said to utter a cry like that of a hare. Little is known of its breeding habits beyond the fact that it appears to nest in holes in trees.

Australian Hawk Owls. — Australia is especially rich in species of this genus, there being some nine or ten, among them the Powerful Owl (*N. strenua*), which is the largest of the group, sometimes reaching a length of twenty-four inches. It is mostly ashy brown above, numerously banded with white or pale brown, the wings being barred with rufous and white, and the tail with six to nine white bars, while the lower parts are mostly white barred with brown on the flanks and sides.

Boobook Owl. — Another well-known Australian species is the Boobook Owl (*N. boobook*), a bird hardly half the size of its great relative. It is deep chocolate-brown above, darker on the head, with the scapulars and wing-coverts spotted with white, the tail dark brown crossed by about eight light bands, while the under parts are bright ochraceous, each feather being centrally streaked with brown.

"Morepork" Owl. — The familiar little Owl of New Zealand, known to the colonists under the name of Morepork (*N. novæ-zealandiæ*), is the only representative of the genus in this area. It is brown above, spotted with fulvous, and rufous streaked with brown and spotted with white below; the length is about twelve inches. The Morepork, which derives its popular name from its peculiar cry, is a strictly nocturnal species, spending the day in the dark recesses of the forest or hiding in the crevices of rocks and outbuildings, and when

discovered at such times is "found sitting upright, with head drawn in, the eyes half closed, and the feathers of the body raised, making the bird appear much larger than it really is." "But," says Buller, "on the approach of night its whole nature is changed; the half-closed orbits open to their full extent, the pupils expand till the yellow irides are reduced to a narrow external margin, and the lustrous orbs glow with animation, while all the motions of the bird are full of life and activity. It then sallies forth from its hiding place and explores in all localities, preferring, however, the outskirts of the forest, where nocturnal insects abound, and the bush clearings in the neighborhood of farms, or the ruins of Maori villages, these places being generally infested with rats and mice, on which it chiefly subsists."

Laughing Owl. — Formerly included in this genus but now referred to a genus of its own is the Laughing Owl (*Sceloglaux albifacies*) of New Zealand, a bird about sixteen inches long, brown, much spotted and streaked with fulvous on back and breast. It formerly subsisted principally on the native rat, but since that species has disappeared this Owl has become exceedingly rare, in fact seems itself on the border of extinction.

Barred Owls. — The Barred or Wood Owls and their immediate allies form a large and widely distributed group (*Syrniinæ*) of three genera and fully forty species of medium-sized or large Owls with a well-developed facial disk. They are without ear-tufts and have stout bills and strong claws, while the tarsi are thickly feathered throughout and the toes usually so. The tail is of moderate length and the wing rounded, with the third, fourth, and fifth quills longest. The plumage above inclines to umber or sepia brown, barred or spotted with buffy or whitish, and the lower parts to whitish, much barred, striped, or spotted with brown.

American Barred Owls. — The best-known North American species is the common Barred Owl (*Syrnium varium*) of the eastern United States and Canada and westward to the Mississippi Valley and Texas. It is a large bird, between nineteen and twenty-four inches in length, being next to the Great Horned Owl in size, and almost as voracious. It mostly frequents heavily timbered regions, preferably swampy tracts near watercourses, and is nocturnal in habits, although not from any defect of vision, for it sees well during daylight. It remains concealed in hollow trees or dense timber and comes forth at evening to seek its prey, which consists of mice, squirrels, rabbits, frogs, crawfish, and occasionally poultry. It is one of the most noisy of our Owls, particularly during the nesting season, its loud, unearthly, and weird *hoo-hoo*, *ho-ho-ho ho-ho*, *hoo-hoo-to-to*, *too-o*, being very frequently heard. For a nesting site they usually select a natural cavity in a tree, but in the absence of a suitable situation of this character they may take the abandoned nest of a Hawk or Crow; they are much attached to the site selected and return again and again even when robbed of eggs or young. At the bottom of the cavity, without much attempt at nest making, they deposit from two to four pure white and slightly granulated or roughened eggs. A slightly darker colored and naked-toed race, known as the Florida Barred Owl (*S. v. alleni*), occurs in the Gulf States from Florida to Texas, and a more spotted

species — the Spotted Owl (*S. occidentale*) — from the tablelands of Mexico northward into the contiguous states of the United States. A subspecies of the latter, known as the Northern Spotted Owl (*S. o. caurinum*), occurs in western Washington and British Columbia. Their habits are presumably similar.

European Tawny or Wood Owl. — Of the Old World species the Tawny or Wood Owl (*S. aluco*) is well known, inhabiting Europe generally as well as the Mediterranean countries of Africa, and exhibiting among other characters a barred or mottled head and the toes completely feathered. The upper parts are ashy gray mottled with brown, while the lower parts are grayish white streaked with brownish black. It is a resident species wherever found, frequenting woods and forests, and is mainly nocturnal in its habits, feeding largely on small mammals, birds, insects, and occasionally fish and frogs. The nest is usually placed in a hollow tree, sometimes an old ruin, a disused chimney, or old nest of Hawk or Crow. The eggs, deposited in March, are three to five in number and pure white. Toward the east, in Asia, China, India, and the Malay Archipelego, the species become more numerous, and the African continent possesses some six or eight.

Great Gray Owl. — Formerly included in the last genus are two splendid Owls that are now referred to a separate genus (*Scotiaptex*), on the ground of their larger size, relatively smaller bill, eyes, and feet, and much broader facial disk. As in certain of the Barred Owls, the toes are entirely covered with feathers. Of these the Great Gray Owl (*S. cinerea*) is a handsome bird of Arctic America, extending as far north apparently as the limit of trees, and coming south in winter to the northern border of the United States. It is from twenty-five to thirty inches in length and has a spread of wings of between fifty-four and sixty inches. In color it is dusky grayish brown and grayish white, varied both above and below with irregular dark markings. It frequents the thick woods of the north, and is regarded by some as being a rather stupid bird, sometimes permitting itself to be taken in the hand without protest, although in defense of the nest it is said to be fierce enough. Its flight appears to be heavier and more labored than is usual among Owls, yet on this point there are differences of opinion. In the southern part of its range it is crepuscular or slightly nocturnal; but at the north, where during the short Arctic summer the sun never sinks below the horizon, it is by force of circumstances abroad in daylight. Its food consists principally of hares, mice, and small birds, and presumably its great size permits it to capture Ptarmigan, Grouse, and other large birds. The nest, of large sticks and lined with feathers, is placed in a tall spruce or poplar, and the eggs are from two to four in number.

Lapp Owl. — In the northern parts of Europe and Asia the above species is replaced by a lighter-colored but otherwise closely allied form known as the Lapp Owl (*S. c. lapponica*), which sometimes strays into western Alaska along the shores of Norton Sound. It is said to be a very rare bird, inhabiting the large forests of the high north and rarely straggling down into the northern parts of central Europe.

The third genus mentioned as belonging to this group is *Ciccaba*, which includes eight species of medium-sized Owls inhabiting mainly Central America and northern South America, but ranging from Mexico to Brazil and Ecuador.

The last of the five or six groups into which the *Buboninæ* is divided (the *Cryptoglaucinæ*) includes some nine or ten genera and upward of sixty species; nearly all are birds of small size, among them being the smallest of the entire suborder. The typical genus may be regarded as *Cryptoglaux*, since it serves as the basis of the group name; it embraces three forms. They are small Owls, under twelve inches in length, with a relatively large head devoid of ear-tufts, and extremely short cere and the bony tube of the ear markedly unsymmetrical on the two sides of the head; the tail is relatively short and the wings long and rounded; the toes are completely feathered. In the adults the plumage is brown above, more or less spotted with white, while the lower parts are white, broadly striped with brown.

Tengmalm's and Richardson's Owls. — The oldest known species is Tengmalm's Owl (*C. tengmalmi*) of north and central Europe and northern Asia, a bird from eight and a half to ten inches long, which may be distinguished from the American representative by its paler color and whitish, usually unspotted legs. It is strictly nocturnal in its habits, frequenting the forests throughout its range, and feeding on small mammals, birds, and insects, especially beetles. It nests in hollow trees, depositing on the chips and rotten wood at the base of the cavity from five to seven pure white, fine-grained eggs. Its note is said to be a single melancholy call uttered at short intervals throughout the night. Taking its place in northern North America is a darker-colored race known as Richardson's Owl (*C. t. richardsoni*). It is a strictly boreal bird, ranging from the northern limit of trees southward to the northern United States, and like its relative is purely nocturnal, spending the day in the seclusion offered by the thick foliage of trees and bushes. Where there are trees of suitable size it nests in old Woodpeckers' holes or natural cavities, but where there are only bushes it takes possession of the abundant nests of other birds. Its call, according to Dr. Merriam, is "a low, liquid note that resembles the sound produced by water slowly dripping from a height."

Saw-whet or Acadian Owl. — The other species is the Saw-whet or Acadian Owl (*C. acadica*), a handsome little bird between seven and a quarter and nine inches in length, found in temperate Canada and northern United States, but extending southward in the western mountains through Mexico to the high mountains of Guatemala. In color it is brown more or less spotted with white above, and white striped with reddish brown below. It is a gentle, engaging little Owl, strictly nocturnal in its habits, spending the day in some dark recess and issuing forth at dusk. Although it is not migratory in the usual sense of the word, it appears to wander more or less in winter, apparently in search of food, and may suddenly become abundant in a locality only to disappear again, perhaps for several years. During the winter it is not uncommonly observed in barns, the writer once having seen several in an old hay barn in Vermont. At such times it is easily approached and may sometimes be taken

in the hand. Curiously enough, it is often found dead in an emaciated condition in the most southern portions of its range, where it is difficult to understand how it could have starved. It usually selects a hollow tree or Woodpecker's hole for a nesting site, but it sometimes makes use of an open nest. The eggs, from four to seven in number, are deposited usually early in April. It takes its common name of Saw-whet from its peculiar rasping call, which resembles the sound produced when a large-toothed saw is being filed. An allied species (*C. ridgwayi*) has recently been discovered in the high mountains of Costa Rica.

True Hawk Owls. — The next in order and the largest of the group are the true Hawk Owls (*Surnia*), which take their name from their very Hawk-like appearance and habits. They are also birds of the north, although considerably less boreal in their range than the Snowy Owl. They are birds of medium size, ranging between fifteen and eighteen inches in length, with the whole plumage very hard and compact and quite unlike that of typical Owls. They have rather short wings, a long, graduated tail, and short legs with densely feathered toes, while the head is flat, without ear-tufts, and with a very poorly developed facial disk. In color they are brown above, with the scapulars, wings, and tail more or less spotted and barred with white, while the top of the head, nape, and upper back are dull and blackish mottled; the under parts are white regularly barred with brown, except the face and throat, which are whitish.

There is but a single species of Hawk Owl which is easily separable into two or three geographical races. The typical form — the Hawk Owl *par excellence* (*S. ulula*) — is known by its light color, the white largely prevailing on the top of the head, hind neck, and scapular region, while the bars on the lower surface are narrower and paler. It is found in northern Europe and Asia as far north as Lapland and Kamchatka, wandering south in winter to northern Germany and accidentally to western Alaska. It frequents especially the open places in the woods and plains where there are scattered trees, hunting in daylight as well as in the evening, the brightest sunlight not incommoding it. The eggs, which number six to eight or even ten, are placed in a hollow tree, or often in the boxes placed by the natives for the accommodation of the Ducks. Its food consists mainly of lemmings and mice, with occasional birds, as the Willow Grouse, etc.

The **American Hawk Owl** (*S. u. caparoch*) is a very dark colored geographical race, in which the black or brownish of head, hind neck, and scapular region predominates over the white, and the bars below are broader and darker. It ranges from Alaska, through the central evergreen forest region to Newfoundland, and wanders southward in winter to the northern border of the United States. "The Hawk Owl," says Dr. Fisher, "is strictly diurnal, as much so as any of the Hawks, and like some of them often selects a tall stub or dead-topped tree in a comparatively open place for a perch, where it sits in the bright sunlight watching for its prey. Although its flight is swift and Hawk-like, it has nevertheless the soft, noiseless character common to the other Owls. When starting from any high place, such as the top of a tree, it usually pitches downward nearly

to the ground, and flies off rapidly over the tops of the bushes or high grass, abruptly rising again as it seeks another perch. Its note is a shrill cry, which is uttered generally while the bird is on the wing."

This species begins nesting at an early date, even in the far North often having eggs early in April. The nest is variously placed, being sometimes a hollow in a coniferous tree, at other times a repaired nest of some large bird, and rarely it appears to be located on the face of some large cliff. When the eggs are placed in a cavity, no nesting material is used other than the chips and powdered wood ordinarily present, but when in a nest outside, it is carefully renovated and usually lined with moss and feathers. The eggs number from three to seven, and are incubated by both parents in turn, and if threatened by marauders, are defended with vigor. This bird subsists almost entirely on small mammals, as lemmings and mice, varied occasionally with Ptarmigan and other birds.

Owlets. — Perhaps most closely allied to the last are the members of the genus *Athene*, a group of six Old World species known as Owlets. As the common name implies, they are birds of small size, all more or less spotted, never barred, with white on the upper surface. The cere is swollen, and the small round orifice of the nostril opens near its front margin. The facial disk is scarcely recognizable, while the tail is of moderate length and the wings rounded, with the third quill generally longest; the tarsus and toes are feathered. The Little Owl, or Owlet (*A. noctua*), is a pretty little bird some eleven and a half inches in length, found in central and southern Europe. The upper parts are brown, mottled and spotted with white, while the lower parts are mostly white, streaked and mottled with brown on the breast. Its habits are much like those of our common Screech Owl, since it frequents gardens, orchards, and old buildings, especially about villages and farm-yards. Although chiefly nocturnal, it is also often seen abroad during the daytime seeking its prey, which consists of mice, small birds, and insects. "It makes no regular nest, but places its eggs in a hole in an old wall or rock, or in buildings, in a hollow tree, or in a hole in the ground." The eggs usually number from three to five and are generally laid in May. A paler, lighter-colored race (*A. glaux*) inhabits the deserts of southern Europe and northern Africa, whence it ranges through Asia Minor, Palestine, and Persia, while another form, known as Hunter's Owlet (*A. bactriana*), with more densely feathered toes, extends from Afghanistan through central Asia and Tibet to northern China. Their habits, so far as known, resemble those of the first species. In the Indian peninsula one of the best-known species is the Spotted Owlet (*A. brama*). It is smaller than the others, being only eight inches long, a uniform brown or grayish above, with numerous white spots arranged in pairs, while the tail is crossed by from four to six white bars, and the under surface is mainly white, crossed in some parts by brown bars. Avoiding the forests, it keeps mainly to the trees in cultivated tracts, especially gardens, and, according to Mr. Blanford, is "commonly found roosting and breeding in the roofs of houses." It feeds chiefly on large insects, but mice, lizards, and small birds are also added to the bill of fare when occasion presents. "Its usual call is a double note, but it keeps up a continual chatter at times, especially in

the evening, often before sunset, always long before dark, when it issues forth from its hiding-place to perch on a pole or fence or telegraph-wire." The eggs, from three to five in number, are placed in holes in trees, a building, or a cleft in a rock. An allied species (*A. pulchra*) occurs in the Burmese provinces.

Forest Owlet. — Very closely related is the Forest Owlet (*Heteroglaux blewitti*) of the thick forests of central India, which by some is included in the last genus, and at best only differs in having a slightly more rounded wing and the opening of the nostril a little nearer the front margin of the cere. In coloration it is quite similar to the Spotted Owlet, except that the white spots are less distinct; it is a rare bird, and little is known of its habits.

Burrowing Owls. — Within the limits of the group of Owls there are perhaps none having more curious and interesting habits than the little Burrowing Owls (*Speotyto*), of which some eight or ten forms are distinguished. They may be known at once by their small size, none exceeding eleven inches in length, their relatively long legs, mainly diurnal habits, and predilection for underground burrows; all are natives of the New World. They have a rather small flat head, short bill, and rather poorly defined facial disk, while the wings are comparatively short and incapable of a long-sustained flight. In color, the plumage is a sandy brownish, spotted, barred, and sometimes otherwise varied with white or buffy above, the lower parts being white or buffy broadly barred, or transversely spotted, with brown; there is also a collar of mixed brown and buffy across the throat, and the middle of the chest is plain white.

Judging from their present distribution the Burrowing Owls are of quite ancient origin, since they are found in southern South America, several of the West Indian Islands, Florida, and the plains region of western North America from British Columbia to Guatemala, the respective habitats being often separated by many hundreds of miles. By the accident of discovery the typical form is assumed to be the South American Burrowing Owl (*S. cunicularia*) which everywhere inhabits the open pampas region of the Argentine Republic, Chile, Paraguay, and probably southern Brazil. Of its appearance in Buenos Ayres Mr. Hudson says: "It never affects concealment nor appears confused by diurnal sounds and the glare of noon. It stares fixedly at a passer-by, following him with the eyes, the round head turning about as on a pivot. If closely approached, it drops its body or bobs in a curious fashion, emitting a brief scream, followed by three abrupt ejaculations; and if made to fly, goes only fifteen or twenty yards away, and alights again with face toward the intruder; and no sooner does it alight than it repeats the odd gesture and scream, standing stiff and erect, and appearing beyond measure astonished at the intrusion." As the North American form will be more fully described, no more will be said of this beyond the fact that, according to Hudson, nine tenths of the Owls on the pampas make their own nesting burrows, the remainder making use of the forsaken holes of various mammals.

Formerly considered as identical with the South American species, the western North American bird is now regarded as constituting a well-marked geographical race (*S. c. hypogæa*). Shunning the timbered and mountainous portions of this

area, they confine themselves to the open prairie and broken lands, where they may almost always be found in and about the prairie-dog towns, or where this animal is absent, they select the burrows of the badger or the various species of ground squirrels. The bird found in Florida, however, appears to excavate its own burrow, while the other may occasionally do so. From the fact that they are so often found about the prairie-dog towns, the idea has gained wide acceptance that they live in these places in harmony with the dogs and attendant rattlesnakes. On this point Major Bendire says: "A good deal of nonsense has found its way into print about the life history of this Owl, and the sentimental story of its living in perfect harmony with prairie dogs and rattlesnakes, both of which inhabit a considerable portion of the range occupied by these Owls, was for years accepted as quite true. From an extended acquaintance with the habits of the Burrowing Owl, lasting through a number of years' service in the west, I can positively assert, from personal experience and investigation, that there is no foundation based on actual facts for these stories, and that no such happy families exist in reality. I am fully convinced that the Burrowing Owl, small as it is, is more than a match for the average prairie dog, and the rattlesnake as well; it is by no means the peaceful and spiritless bird it is generally believed to be, and it subsists, to some extent at least, on the young dogs, if not also on the old ones."

Of the habits of these Owls, Bendire further adds: "These birds are diurnal in their habits, and may be seen sitting in front of their burrows at any hour of the day. When not unduly molested, they are not at all shy, and usually allow one to approach them near enough to note their curious antics. Their long, slender legs give them a rather comical look — a sort of top-heavy appearance, and they are proverbially polite, being sure to bow to you as you pass by. Should you circle around them, they will keep you constantly in view, and if this is kept up, it sometimes seems as if they were in danger of twisting their heads off in attempting to keep you in sight. If you venture too close, they will rise and fly a short distance and generally settle down near the mouth of another burrow close by, uttering at the same time a chattering sort of note, and repeat the bowing performance. They hunt their prey mostly in the early evening and throughout the night, more rarely during the daytime. As soon as the sun goes down, they become exceedingly active, and especially so during the breeding season."

Their food consists largely of insects and small mammals as well as lizards and centipedes, etc. They are exceedingly voracious, eating fully as much as their own weight in twenty-four hours, if it can be obtained, and with a family of eight or ten to care for, it is easily seen what an enormous amount of food is required.

This Burrowing Owl is more or less migratory, especially in the more northern portion of its range, and when they return in the spring they appear to be always mated, and the mating is apparently for life. Nesting may begin in the latter part of March and extend into June, according to location. The nesting burrows vary greatly in length, being rarely under five feet, and not infrequently are over ten feet long. They usually enter diagonally for two or three feet, and then

turn in one direction or another, the nesting chamber being at the highest point. This chamber is ordinarily twelve to eighteen inches wide and is usually lined with dry horse or cow dung to a depth of one or two inches, though occasionally with grass, feathers, or hair. Both burrow and chamber are often in a very filthy condition. The eggs number from six to twelve, the usual complement being from seven to nine; they are pure white and glossy when clean, but are frequently much soiled by the unsanitary contents of the nest.

The Florida Burrowing Owl (*S. c floridana*), which is found in Florida and in a very slight color-form in the adjacent Bahama Islands, differs from the western form in being smaller, though with larger bill and feet, and the spots above are white with little, if any, buff tinge, and the brown areas darker. Another form (*S. c. dominicensis*) is found on the island of Haiti or Santo Domingo, while what are regarded as distinct species are found on Antigua, Guadaloupe, Clarion Island off the coast of Lower California, and Margarita Island, Venezuela. That from the latter island, known as the Short-winged Burrowing Owl (*S. brachyptera*), is a small, very pale form, the color of which harmonizes perfectly with the faded yellowish grass surrounding their burrows; they feed on grasshoppers and beetles.

Pygmy Owls. — Also of small size, as may be inferred from the name, are the so-called Pygmy Owls (*Glaucidium*) of which some thirty species are known, ranging over much of the tropical and temperate portions of the Old World excepting Australia, and in the New World over the southern portions of North America and practically the whole of South America. These little Owls have a small, rounded head without ear-tufts, tubular nostrils which open in the somewhat swollen cere, quite short and rounded wings with the fourth quill usually longest, and a densely feathered tarsus.

To that section of the genus which is characterized by having the upper parts more or less spotted with white, belongs the American Pygmy Owl (*G. gnoma*), a bird from six and a half to seven and a half inches in length, which inhabits the western United States east to Colorado and New Mexico, and south to the highlands of Mexico. The back is slaty grayish or brownish in color, the top of head spotted or dotted with white or buffy, the sides of the breast brownish spotted with paler, and the lower parts whitish striped with blackish; the tail is crossed with white bands. It mostly frequents wooded districts, although it is occasionally found at some distance from timber, and is diurnal in its habits, feeding and flying about during the daytime, although it is perhaps more commonly abroad in the early dusk and morning. It is a tame and unsuspicious bird, and is apparently at times more or less sociable, as Mr. Henshaw speaks of finding them in small companies in New Mexico. It feeds on insects, small mammals, and birds, as well as reptiles and batrachians. Major Bendire relates an amusing incident of one attacking a large gopher which carried it along for some distance on its back. Its presence is usually little noticed by other birds, though occasionally it is mobbed like its larger relatives. But few of its nests have ever been discovered, and such as have fallen under scientific observation were usually placed in deserted Woodpeckers' holes. The California Pygmy

Owl (*G. g. californicum*) is a darker-colored race, which is an inhabitant of, and breeds in, the timbered regions along the Pacific coast from middle California to Oregon and British Columbia; this form is replaced in the Cape region of Lower California by Hoskin's Pygmy Owl (*G. hoskinsii*), which is smaller and grayer, with the upper parts less distinctly spotted than the California bird. The only other species occurring in the United States, and this simply by virtue of crossing over the line in Texas and Arizona, is the Ferruginous Pygmy Owl (*G. phalænoides*), which may be distinguished by having the top of the head streaked, instead of spotted, with white.

Of the species belonging to the second section of the genus in which the upper surface is barred instead of spotted, we may mention the Large Pygmy Owl (*G. cuculoides*) of the Himalayas, the hills of central India, and the Burmese provinces. Of its habits Mr. Blanford says: "This is one of the least nocturnal of all Owls, and may often be seen in full sunlight, sometimes even at midday, sitting on trees or stumps, or moving about and feeding in shady gardens or jungle. It keeps to thin tree — or bamboo — jungle, or gardens, and feeds partly on insects, but also on small birds and mammals. Its cry is a peculiar cackle, like a laugh, called by Hume a 'chuckling, vibrating call.' The eggs, four in number, are deposited in a hollow or hole in a tree without any nest."

Elf Owls. — The final genus of typical Owls embraces the two species of quaint little Elf Owls (*Micropallas*), the smallest members of the entire suborder, and quite to be compared in this respect with the little Falconets, the most diminutive of the diurnal birds of prey. These little Owls, which are hardly more than six inches in length, have a small, weak bill, which is hidden among recurved and oppressed bristly feathers, while the facial disk is imperfect, the wings relatively very long but rounded, and the tail of moderate length. The tarsi are nearly naked, the feathers extending but a little way below the heel-joint, the lower portion as well as the upper surfaces of the toe being covered with short, bristly hairs. A very marked character is afforded by the claws, these being remarkably small, weak, and little curved, "hardly more than insessorial, instead of raptorial, in character."

The first species to be discovered was the Elf Owl, or Whitney's Owl (*M. whitneyi*), as it is sometimes called, which was found about 1861 at Mojave, in southern California, at a point, however, which subsequent events have shown was near the extreme north and western limit of its range, whence it extends southwestward through southern Arizona, and is there the commonest Owl of the region. It is nocturnal in its habits, being seldom abroad during the daytime, but spending this time in concealment in abandoned Woodpeckers' holes in trees and giant cactus, or in the densest thickets. They are very quiet, gentle little Owls, rarely protesting when taken in the hand, and several are often found in company. When one finds that it has been observed, it sits quite erect and perfectly motionless, often, according to Mr. Stephens, holding up one wing in front of the face as a sort of shield. The call note, which is frequently repeated and in different keys, is described by Bendire as resembling the syllables "*cha-*

cha, cha-cha," and is not unpleasant in sound. Its food consists almost entirely of insects, especially grasshoppers and large beetles. The favorite nesting sites of these remarkable little Owls are deserted Woodpeckers' holes in the giant cactus, rarely in holes in trees, such as cottonwood or mesquite. There is no nest, the eggs, which number from two to five, being deposited on a few chips at the bottom of the cavity; both parents assist in incubation, which lasts about two weeks. The other species is the Socorro Elf Owl (*M. socorroensis*) of Socorro Island, western Mexico.

THE GOATSUCKERS AND THEIR ALLIES

(Suborder *Caprimulgi*)

The third of the suborders into which the *Coraciiformes* is divided, is a relatively small, though widely spread, group of medium-sized birds known variously as Goatsuckers, Nightjars, Frogmouths, etc. They have rather compact bodies, with short legs, long, pointed wings with ten primary quills, a widely gaping mouth, and generally softly tinted gray and brown plumage; the tail-feathers are ten in number. They are further distinguished structurally by having the skull holorhinal, that is, with the nasal bones only slightly or not at all cleft, the organ of voice (syrinx) bronchial, and the oil-gland nude, when present, while the aftershaft to the feathers is present, though small, and the blind intestine (cæca) present and functional. The young are hatched helpless, but covered with down, and all the members of the suborder are crepuscular and nocturnal.

As regards the position of this group, Mr. Beddard says: "The relationship of the *Caprimulgi* to other groups is a puzzle hard of solution. This is partly, perhaps, due to the fact that the Goatsuckers are probably a somewhat ancient group." He decided, from all the evidence, that their nearest relatives are the Owls, a conclusion which "is in harmony with much recent opinion, and is curious in view of the external likenesses which bind together the two groups of birds, likenesses which might fairly be put down to similarity of habit. These superficial resemblances are, however, enforced by more deep-lying structural similarities." Of these it may be mentioned that the Owls come nearest to them in the "primitive character of the gut, while the cæca, swollen at the ends, are alike in both. The Owls, too, are nearly the only other coraciiform birds besides the *Caprimulgi*, which have well-defined basipterygoid processes."

The *Caprimulgi* is divided into three families — the *Steatornithidæ*, which comprises only the peculiar Oil-bird, the *Podargidæ*, or Frogmouths, of which there are three genera and about thirty-five species, and the *Caprimulgidæ*, or Goatsuckers or Nightjars. The latter family is separated into two well-marked subfamilies — the *Caprimulginæ* and *Nyctibiinæ*, — and comprises twenty genera and about one hundred and twenty-five species and subspecies. The characters separating them are described more fully later.

THE OIL-BIRD

(Family *Steatornithidæ*)

We may begin the consideration of the suborder *Caprimulgi* with an account of the remarkable Oil-bird (*Steatornis steatornis*), which constitutes by itself a very distinct family, showing points of agreement with both the Owls and Goat-

Fig. 165. — Oil-bird, *Steatornis steatornis*.

suckers, but on the whole differing from either. It was discovered by the celebrated Humboldt a little over a century ago in a cave near the mission of Caripé, Venezuela, but has since been found inhabiting caverns in Guiana, Colombia, and Trinidad, as well as Ecuador and Peru. About eighteen or twenty inches in length, it has comparatively weak legs and feet, but large, strong wings and a hard, strong, somewhat Owl-like bill, which is deeply notched and provided

with about twelve long bristles on each side of the gape. In the color the plumage is somber brownish, spotted with white and barred and penciled with dark brown or black, indicating, as in the Owls and Goatsuckers, a bird of nocturnal habits, and such it is, spending the day sleeping in deep, dark caverns and issuing noisily forth toward evening to secure its food, which, so far as known, consists entirely of oily seeds. Apparently they are sometimes forced to seek their food at great distances, as it has been recorded that the stomachs of birds killed at Caripé contained seeds that could not have been obtained within a distance of eighty leagues. In certain localities they occur in vast numbers, and when disturbed during the daytime, or when starting out at evening, utter loud, harsh cries, whence the native name of Guacharo, which is said to be an old Spanish word "signifying one that cries, moans, or laments loudly." Mr. William T. Hornaday, director of the New York Zoölogical Park, has given a graphic account of a visit to a cave inhabited by the Oil-birds on the northwestern extremity of the Island of Trinidad. This cave, in a precipitous wall of rock, opened on the broad Caribbean Sea, and could only be visited in the calmest weather, and even then not without danger. Waiting until a big wave came rolling in, they sent the boat on its crest and were carried into the mouth of the cavern. "The moment we entered," he says, "there arose a perfect storm of rasping cries coming from the throats of about two hundred Guacharo birds, that circled about the top of the cave. The walls of the cave were smooth, bare rock, but on one side a huge mass of fallen rock formed a series of ledges from the floor up to a height of thirty feet. Climbing upon this we found numerous nests of the Guacharos. Wherever a smooth spot offered a soft resting place, the nests were placed like so many cheeses, while others were built half Swallow-like on the slope." These cheese-like nests run about eight or nine inches in diameter and from three to six inches high, being slightly hollowed on top. They were quite solid and composed apparently of the undigested skins and seeds of fruits mixed with tenacious mud or the droppings of the birds themselves. The eggs are from two to four in number, pure white, but smooth and lusterless, as in certain Owls. The young birds soon become a perfect mass of fat, and are then secured in great numbers by the native Indians, who melt out the oil and run it into earthen pots and retain it for further consumption as a substitute for butter. This oil is said to be colorless and odorless, and may be kept for a year or more without becoming rancid. The delicate young birds are also esteemed for food by some, but their rather strong cockroach-like odor is objectionable to most palates.

THE FROGMOUTHS

(Family *Podargidæ*)

Apparently quite closely allied to the Goatsuckers, and for which some of them might readily be mistaken, are the curious Frogmouths, so called from their enormously widened and flattened bills, which have been likened to the widely gaping mouth of a frog. They have much the same shape and mottled

plumage as the Goatsuckers, and like them are strictly nocturnal and insectivorous, but structurally they differ in a number of particulars, perhaps the most important being the desmognathous instead of the split (schizognathous) form of palate, and the absence of an oil-gland, and some of them are further characterized by the presence of a large powder-down patch on each side of the rump. Their nesting habits and eggs are also quite different from those of the Goatsuckers and Nightjars, as will be shown later. They are all natives of the Old World, being mainly confined to the Malayan and Australian regions, and are comprised in three genera and about thirty-five species. They are often further divided into two subfamilies, in the first of which (the *Podarginæ*) the nostrils are slit-like and protected by an overhanging flap and the whole concealed by plumes and feathers, while in the other (the *Ægothelinæ*) the nostrils are near the tip of the bill and are obvious and open.

True Frogmouths. — The true Frogmouths (*Podargus*), of which seven or eight forms are known, may be taken as typical of the first subfamily. They are mostly birds of large size, some of them reaching a length of twenty-one inches, and have the tail-feathers pointed, the central pair being much longer than the adjoining pairs. They are confined to the Papuan Islands, Australia, and Tasmania, and are described by Gould as being an "inanimate and sluggish group of birds, and depend for their supplies less upon their power of flight than upon the habit they are said to have of traversing the branches of various trees upon which their favorite insects reside. The Tawny-shouldered Frogmouth (*P. strigoides*) of Australia and Tasmania is one of the best-known species, and may be selected for description, as the others agree closely with it in habits. About eighteen or nineteen inches in length, of which the tail is fully nine inches, the upper plumage is gray, vermiculated and shaded with brown and spotted with white, all the feathers with broad black shaft-lines, while the shoulders and wings are tawny, and the lower parts whitish gray shading into tawny, with black stripes on throat and breast. There appears to be considerable individual variation, some examples being much lighter, others darker, and others again more mottled.

They frequent a great variety of places, as the thick brushes near the coast, the hilly districts, and the thinly wooded plains of the interior, and are strictly nocturnal, sleeping through the day on the dead branch of a tree, in an upright position across, and never parallel to, the branch, which they so much resemble as scarcely to be distinguished from it. They are usually observed in pairs, sitting near each other on the branches and often not at all sheltered from the sun. "So lethargic are its slumbers," says Gould, "that it is almost impossible to arouse it, and I have frequently shot one without disturbing its mate sitting close by. When aroused, it flies lazily off with heavy, flopping wings to a neighboring tree, and again resumes its slumbers until the approach of evening, when it becomes as animated and active as it had been previously dull and stupid." It is of course silent during the day, but at night it has a loud, hoarse call of two distinct notes, which can hardly be described. They make a slightly constructed flat nest of small sticks carelessly interwoven together, and placed at the fork of a horizontal branch of sufficient size to insure its safety. The eggs are usually

two in number, pure white, and of a long, oval shape. Both sexes assist in incubation, and the young are covered with a white down, but they soon attain adult plumage. The largest species is the Papuan Frogmouth (*P. papuensis*) of the Papuan Islands and northern Australia, which attains a length of twenty-one inches, and the smallest is the Marbled Frogmouth (*P. ocellatus*), also of the Papuan Islands, which is only thirteen inches long.

Eared Frogmouths. — Distinguished by their smaller size and rounded tail-feathers are the Eared Frogmouths (*Batrachostomus*), of which a dozen species are known, extending from the eastern Himalayas to the Malay Peninsula, the Philippines, Sumatra, Java, and Borneo. They take their common name from the fact that the head in some species is adorned with ear-tufts of bristly plumes. The plumage is in general similar to that of the other Frogmouths, but in the matter of nest building they depart widely from them, making, according to Mr. Ernst Hartert, a "soft pad, formed of down, taken from the powder-downs of the bird itself, and then completed by having the outside interwoven and covered with bits of bark and lichen, so that the nest entirely resembles the branch to which it is attached." The nest of the Sikhim Frogmouth (*B. hodgsoni*) is briefly described by Hodgson as nearly flat and a mass of lichen and moss overlaid with a soft downy vegetable substance blended into a felt-like mass, but he may have been misled as to the nature of the substance. The eggs are pure white and one or two in number. But relatively little is known of the habits of these birds.

Owlet Frogmouths. — The curious little Owlet Frogmouths (*Ægotheles*), to the number of a dozen or more species, are the only representatives of the second of the above-mentioned subfamilies. In addition to the characters pointed out it may be mentioned that they are without powder-downs and have nesting habits differing from those of either of the other genera. They are small birds, from seven to twelve inches long, mainly found in New Guinea, with a single species each in the Molucca Islands, Australia, and New Caledonia. Comparatively little has been recorded regarding their habits, perhaps the best-known being the Australian Owlet Frogmouth (*Æ. novæ-hollandiæ*), which is about eight and a half inches in length, dusky vermiculated and barred with pale gray above, the top of the head deep brown with two longitudinal stripes and two crescents on the hinder portion whitish, and the tail with twelve or more whitish gray bars and the lower parts whitish, vermiculated with dusky. It is distributed quite as generally as the Tawny-shouldered Frogmouth, frequenting the densest brushes near the coast and the more thinly wooded districts of the interior. Gould states that during the day this bird resorts to the hollow branches and holes of gum trees, sallying forth as night approaches in quest of insects, principally small beetles. Its flight is straight and not characterized by the sudden turns and descents of the ordinary Goatsucker. "On driving it from its haunts," he says, "I have sometimes observed it to fly direct to a similar hole in another tree, but more frequently to alight on a neighboring branch, perching across and never parallel to it. When assailed in its retreat it emits a loud hissing noise, and has the same stooping motion of the head observable in the

Fig. 166. — Eared Frogmouth, *Batrachostomus septimus*.

Owls; it also resembles that tribe of birds in its erect carriage, the manner in which it sets out the feathers around the ears and neck, and in the power it possesses of turning the head in every direction, even over the back, a habit it is constantly practising." In the holes in trees, without forming any nest, it deposits its eggs, which are four or five in number, perfectly white, and nearly round. In a single case, that of *Æ. wallacei* of New Guinea and Aru Islands, Meyer has stated that the eggs are marked with pale striations.

THE GOATSUCKERS, OR NIGHTJARS

(Family *Caprimulgidæ*)

The present group is a very well marked aggregation of quite uniform appearance, the plumage of all being soft and showing a mottling of brown, gray, black, and white, in this respect quite suggesting the Owls, which are now regarded as being perhaps their nearest of kin. They are mainly nocturnal in their habits, feeding almost entirely on insects for the capture of which they are wonderfully well adapted, the mouth being cut back as far as the eyes and the naturally wide gape often further increased by a fringe of long bristles along the edge of the bill, thus making a regular insect net. The bill itself is relatively short, weak, and flexible, and the nostrils mostly tubular, while in the typical members the foot is peculiar in that the outer toe has only four joints, and the middle toe is long and has its claw pectinated on the inside. Their flight is swift, and, as might be inferred from the softness of the plumage, is nearly noiseless. Their mournful, often strangely human, cries, suggestive of the words *whip-poor-will*, *poor-will*, *who-are-you*, *work-away*, etc., have made them objects of superstitious dread among uncivilized and ignorant people from the earliest times. If heard by an Indian close to his wigwam, misfortune is thought to be brooding over it, and he awaits with terrified suspense the impending evil. Even to those of stronger nerves the weird cries are anything but reassuring. Dr. Coues says of the Poorwill of the West: ". . . the wailing chorus is enough to excite apprehension on the part of the lonely traveler, as he lies down to rest by his camp-fire, or to break his sleep with fitful dreams, in which lost spirits bemoan their fate and implore his intercession. Experience comes vividly to mind as I write, of night after night, when I have gradually lost consciousness with a mind peopled with all manner of strange images."

The name of Goatsucker as applied to these birds dates back hundreds of years from the fancied notion that because they are often seen about flocks and herds they subsist on stolen milk. "Poor little injured bird of night," says Wharton, "how sadly hast thou suffered and how foul a stain has inattention to facts put upon thy character! Thou hast never robbed man of any part of his property, nor deprived a kid of a drop of milk."

The nesting habits of these birds are of the simplest kind, since the eggs, always two in number, are placed upon the ground, the bare rock, or a flat house-

top, without even the pretense of a nest. The eggs are usually mottled or marked with grayish purple or lavender, on a white or cream-colored ground, but are sometimes plain white, admirably adapting them in color to their surroundings. Unless the exact spot is noted whence the sitting bird is flushed, it is almost impossible to find the eggs. The colors of the birds themselves are also strongly protective, especially those dwelling in arid districts, which are often of a sandy hue.

The present family, which embraces about one hundred and twenty species, is widely distributed throughout the world except some of the eastern Pacific islands and the Arctic and Antarctic regions, being, however, most abundantly developed in tropical countries, where insect life is always plentiful. With the exception of a single genus and seven species, the entire group is comprised in the subfamily *Caprimulginæ*, or the typical Goatsuckers, or Nightjars, the members of which are distinguished by the absence of powder-down patches, and in having the so-called typical foot, in which the outer toe has but four joints and the claw on the middle one is curiously fringed.

Nighthawks. — Before passing to a consideration of what may be called the normal or typical members of the subfamily, we may well dispose of some half a dozen genera of somewhat outlying forms in which the gape is without conspicuous bristles, the most important genus being *Chordeiles*, or so-called Nighthawks, which to the number of about a dozen species and subspecies range throughout practically the whole of North and South America and the West Indies. Approximately nine or ten inches in length, they are distinguished structurally by having an emarginate tail and a long, narrow wing in which the outer quill is longer than the next, while the plumage is mottled blackish and grayish — sometimes ochraceous — above, and whitish or buffy, barred with dusky below, the throat marked more or less conspicuously with an A-shaped patch of white or buff, while the tail is banded with dusky and the wings plain dusky marked near the middle of the longer quills with a large spot of white or buffy. The typical form, in which the dusky markings predominate above, is the common Nighthawk (*C. virginianus*), an abundant summer resident in suitable situations throughout most of eastern North America, reaching Hudson's Bay and the valley of the Mackenzie on the north, and the edge of the Great Plains and the northern Pacific Coast States on the west, and wintering in middle America and eastern South America. The Nighthawk, or Bullbat, as it is often called, frequents the edges of forests and clearings, meadow lands along river bottoms, and cultivated fields, "as well as the flat Mansard roofs in many of our larger cities, to which it is undoubtedly attracted by the large amount of food readily obtainable in such localities, especially about electric lights." During the heat of the day it may be found resting on horizontal limbs of trees, on fence rails, flat lichen-covered rocks, old logs, chimneys, etc., always sitting lengthwise and rarely descending to the ground. While it is mostly abroad on cloudy days or in early mornings or evenings, it is not infrequently observed skimming about, on bright sunny days, and, as Major Bendire says: "It is one of our most graceful birds on the wing and its aërial evolutions are truly wonderful; one moment it may be seen

soaring through space without any apparent movement of its pinions, and again its swift flight is accompanied by rapid flapping of the wings, and this is constantly more or less varied by numerous twistings and turnings. I know of no more interesting sight than to watch a number of Nighthawks, while engaged in feeding, skimming close to the ground or over the waters of some pond or lake, gliding along in all kinds of serpentine gyrations with the utmost grace and ease. During the early spring the male frequently descends rapidly from high above, the vibration caused by the air passing through the primaries producing a peculiar booming sound which has been compared to that made by blowing through the bung-hole of an empty barrel. It is amazing to see what perfect control these birds have over themselves during this peculiar performance; descending as they do almost with the rapidity of a lightning flash, one would think they could not possibly arrest their downward course in time to prevent being dashed to the ground; but at the proper moment, by a single reverse movement of their wings, they rise in a gradual curve, to resume their flight or repeat the performance."

The Nighthawk feeds exclusively upon insects, such as flies, mosquitoes, beetles, night-flying moths, etc., all of which are captured on the wing. Like the rest of the *Caprimulgidæ*, it makes no nest, but deposits its two handsome, variously blotched and speckled eggs on the bare ground, often in exposed situations, or on flat rocks, in corn or potato fields and, in later years, on the gravel-covered roofs of houses in the larger cities. While sitting the protective coloration of the bird renders it inconspicuous, and often it does not flush until the intruder is almost upon it, then with fluttering wings and low cries of distress the bird tries to draw him away from the eggs.

Slightly smaller and paler than the above is the Florida Nighthawk (*C. v. chapmani*) of Florida and the Gulf coast, while still paler is Sennett's Nighthawk (*C. v. sennetti*) of the Great Plains, and more rusty both above and below is the Western Nighthawk (*C. v. henryi*) of the western United States. The several South American forms are distinguished in the main by having distinct rufous markings on the wings in front of the conspicuous white patch; their habits, however, do not appear to differ from those mentioned. Formerly included in *Chordeiles*, but now placed in a genus by itself, is a very small South American Nighthawk (*Nannochordeiles pusillus*), which is only about six inches in length; it is deep brown above, spotted and mottled with rusty.

Eared Nightjars. — Passing over a number of small and relatively unimportant South American genera, mention should be made of an Old World genus which falls within the group of those lacking the rictal bristles, namely, the Eared Nightjars (*Lyncornis*), the seven species of which range from the eastern Himalayas to New Guinea. As implied by the name, they are distinguished by the presence of ear-tufts or aigrettes, which consist of a few elongated feathers just above and behind the ear-coverts. The largest and perhaps best-known species is the Great Eared Nightjar (*L. cerviniceps*) of some portions of India, a bird about sixteen inches in length, rich brown and buff, beautifully mottled above, and buffy barred with black below, set off by a large white spot on the throat. It frequents

the evergreen forests and is apparently more nocturnal than the Nighthawks, as it has been found spending the day in caves, issuing forth soon after sundown and hawking for its food, at first flying at a considerable height, then nearer the ground.

Fork-tailed Nightjars. — In all of the remaining genera the rictal bristles are pronounced and long, the first to be considered being a group of three genera in which certain of the tail-feathers are more or less elongated, winning for these birds the name of Fork-tailed Goatsuckers. In *Macropsalis*, the four species of which are found in tropical South America, it is the lateral pair of tail-feathers which are greatly lengthened, the others decreasing in length to the middle pair, which are shortest. Thus in *M. lyra*, the largest species, the total length of the bird is thirty-one inches and the length of the lateral rectrices about twenty-seven inches, while the middle pair are only about three and a half inches; the female is quite similar to the male, but lacks the long outside tail feathers. The genus *Hydropsalis*, also of South America, is similar to the last except that the middle as well as the lateral pairs of rectrices are elongated, the pair next to the central pair being shortest. In the Argentine Fork-tailed Goatsucker (*H. furcifer*) the total length is twenty inches, while the lateral tail-feathers are fifteen inches long and the central pair seven and a half inches. It is a handsome bird, brown varied with black above, paler beneath, with light rufous collar, white or fulvous-spotted wing-coverts, and black rufous banded wings, while the outer rectrices are black edged with white and the others much like the back. Durnford found the species not uncommon in Buenos Ayres in spring and autumn, living on the ground in damp situations when the grass is long and thick enough to afford some slight cover, and generally observed in small parties. Its flight is noiseless and performed by jerky, erratic movements. Professor W. B. Barrows also observed it near Concepcion on the lower Uruguay, where he says it frequents open or sandy spots in the woods, especially along the margin of streams, sitting by day close on the ground, but at night flying about as noiselessly as a butterfly and continually opening and shutting its beautiful tail, keeping up all the time a very soft clucking, which is its only note, so far as he observed. Neither of the above writers found the eggs, but Mr. O. N. Aplin found them in Uruguay and describes them as being of a creamy pink marked with delicate lines and veins of lilac. In the African Fork-tailed Goatsuckers (*Scotornis*), of which two forms are known, it is the central pair of tail-feathers that are greatly lengthened, while the outer ones are shortest, or just the reverse of the condition in *Macropsalis*.

Leone Goatsucker. — Africa is also the home of a couple of genera, each with a single species, in which certain of the wing-quills in the male are greatly elongated, producing curious streamers which float behind them as they fly. Thus in the rare Leone Goatsucker (*Macrodipteryx longipennis*) the ninth primary is enormously lengthened, being some seventeen inches long, while the total length of the bird is only eight or nine inches. These long pennants have the shaft bare except for the terminal five or six inches, when they are expanded into a racket-shaped web. According to Heuglin, this shaft is not bare in freely moulted specimens, while Dr. Sharpe expresses the opinion that these elongations may be assumed only during the breeding season, as it is not often

taken in the full perfection of plumage. When sitting on the ground these long feathers are held at right angles to the body and form waving plumes, simulating blades of grass high above the bird.

Standard-winged Goatsucker. — In its near ally, the Standard-winged Goatsucker (*Cosmetornis vexillarius*), the sixth, seventh, eighth, and ninth primaries are more or less lengthened, the ninth most so, being some eighteen inches longer than the first; it is not, however, bare for any portion of its length. The bird is rather handsome, being about ten and a half inches long, dark brown mottled with pale rufous above and white somewhat barred with brown below, while the primaries are dark brown, white for the basal third or more of their length, the ninth being almost pure white throughout. When seen on the wing at dusk, Mr. Andersson states that they present a "most singular appearance, giving the idea of a huge double-winged bat." The species inhabits South-east Africa and thence west to the Congo, being usually noted, according to Sir John Kirk, who observed them in Nyassaland, in flocks of from fifteen to twenty. "It was only during the months from October to January that the singular prolongation of the wing-feathers was observed; these are peculiar to the males. Like other Nightjars, the habits of these birds are crepuscular. When startled during the daytime from the ground, where they always nest, they fly swiftly for a short distance and again settle, but are extremely difficult to follow with the eye. Not so the males in full plumage. In their case there is no difficulty; their flight is evidently retarded, and they become prominent objects from the long streamers waving behind them."

Poorwills. — Passing over the Short-winged Goatsucker (*Heleothreptus anomalus*) of South Brazil and Argentina and the Parauques (*Nyctidromus*), of which a single form (*N. albicollis merrilli*) occurs in southern Texas and northern Mexico, we come to the Poorwills (*Phalænoptilus*), so called in imitation of their notes. They are rather closely allied to the Whippoorwills (*Antrostomus*), from which, however, they are separated by having the tarsus longer instead of shorter than the middle toe, and entirely naked in front instead of feathered almost to the toes. The typical form is Nuttall's Poorwill (*P. nuttallii*) of the western United States, a bird from seven to eight inches in length, the upper parts a soft brownish gray, with a very velvety moth-like surface, relieved by irregular spottings and zigzags of black, while the throat has a large patch of white and the under parts are barred with blackish and light buffy. While not altogether absent from woodlands, it is preëminently a bird of the open prairie and the almost barren and arid regions of the interior, spending the daytime on the ground and becoming active at dusk. They are usually very tame, often allowing one to approach within two feet before moving, and have a peculiar, mournful-sounding note which is variously rendered as *poor-will*, *puih-whee-ee*, *puir-whee-ee*, etc. The eggs are generally placed on bare patches of gravel, or on low flat rocks, usually near a bunch of grass or weeds. Two subspecies are recognized, the Frosted Poorwill (*P. n. nitidus*), which is similar but paler and has the upper parts especially whiter and more frosty in appearance, and the California Poorwill (*P. n. californicus*), a darker form occurring on the coast of California.

The **Whippoorwills** (*Antrostomus*) are very closely related to the true Goatsuckers (*Caprimulgus*), so closely, in fact, that many ornithologists deny the possibility of separating them generically, but following the American interpretation they are here regarded as distinct. The best-known, and the Whippoorwill *par excellence* (*A. vociferus*), is a common summer visitor throughout eastern North America, nesting from the Gulf States to New Brunswick and Manitoba, and retiring in winter from the Gulf States southward. It is brownish and grayish, much mottled and otherwise varied with black above, the primaries black with broken rufous bars, the tail irregularly barred with black and mottled with whitish or buffy, the terminal half of the outer three white in the male, while the under parts, with the exception of a narrow white band across the upper breast, are cream-buff barred irregularly with blackish; the length is about ten inches. The Whippoorwill is a familiar bird to every farmer boy throughout its range, though it is much oftener heard than seen, and in fact is so frequently mistaken for the Nighthawk that many otherwise well-informed persons regard them as the same. They are, of course, perfectly distinct, as could be easily seen if the birds were held in the hand; but the Nighthawk may always be distinguished when on the wing by the conspicuous white patch on the primaries, which "has the appearance of being a hole in the bird's wing." The favorite resorts of the Whippoorwill are dense, shady thickets, bordering on clearings and river valleys, rocky and brush-covered hillsides, and rolling country interspersed with woods and cultivated tracts; here it passes the hours of daylight in shady retreats either on the ground or low limbs of trees or on or under rocks. When the sun goes down its day begins, and leaving its retreat, it passes out to the edges of the clearings or bushy fields, where it catches its food of night-flying insects, resting now and then on some fence rail or stump and giving voice to its note. The two handsome dull white, lilac-and-brown-spotted eggs are deposited on the ground or leaves in woods or thickets. Rather closely related, but two inches longer and with the basal half of the rictal bristles provided with lateral filaments, is the Chuck-will's Widow (*A. carolinensis*) of the eastern United States from southern Virginia to southern Illinois and southward. Its haunts and habits are similar to those of its relative, but its call is different, resembling the words *chuck-will's-widow* repeated often rapidly for two or three minutes at a time. While its food consists principally of insects such as beetles, winged ants, and moths, it is well authenticated that it sometimes aspires to larger game, as the remains of small birds such as Sparrows, Hummingbirds, etc., have been found in its stomach. Several other species and subspecies are sometimes recognized, but lack of space forbids mention of them.

True Goatsuckers. — We have now come to the last and by far the largest genus of the subfamily, namely, *Caprimulgus*, or the so-called true Goatsuckers, of which there are hardly less than sixty species. As here restricted, they are exclusively developed in the Old World, over which they enjoy a wide range. Of the great number only one, the European Nightjar (*C. europæus*), occurs, except as a very rare straggler, in the British Islands, being found also throughout Europe and southern Siberia, wintering in Africa. It arrives in England from

its winter home about the middle of May, frequenting commons, moors, and stony places, returning year after year to the same spot. It is about ten inches in length, ash-gray spotted and barred with black, brown, and chestnut, and has the three first primaries with a large patch of white on the inner web and the two outer pairs of tail-feathers white-tipped; its habits are those of the group in general. In western Europe and central Asia its place is taken by other closely allied forms, while in southwestern Europe and northern Africa occurs the Russet-necked Nightjar (*C. ruficollis*), which is larger and paler and more rufous especially on the under parts, and has a broad rufous collar. India is the home of half a dozen or more species, the commonest being the Indian Nightjar (*C. asiaticus*), which Mr. Blanford states is a bird of the plains and open and cultivated country, of groves, and gardens and low jungle, commonly near habitations, while the Jungle Nightjar (*C. indicus*), as the name suggests, frequents the forests.

Wood Nightjars. — The second of the two subfamilies of the *Caprimulgidæ* comprises, as already indicated, only a single genus and seven species (*Nyctibius*), known as the Wood Nightjars, all natives of the New World and ranging from Jamaica and Mexico throughout the tropical parts of South America. It is a very well marked group, distinguished by having the normal number of joints to the outer toe, by the absence of the fringe on the claw of the middle toe, and by the presence of large powder-down patches on the sides of the body and breast; furthermore the tarsus is extremely abbreviated, being much shorter than any of the toes, while the bill is provided with a curious hook or tooth on the upper mandible near the tip. The plumage is more mottled than in the members of the typical subfamily, being grayish or brownish, much spotted and streaked with blackish; the length varies in the different species between nine and some twenty inches, one of the best-known and widely distributed being the Great Goatsucker (*N. jamaicensis*). Of its habits in Jamaica, where it is known as the Potoo, Gosse says that it is not infrequently seen in the evening "taking its station soon after sunset on some dead tree or fence post, or floating by on noiseless wing, like an Owl, which the common people suppose it to be. The plumage has the soft, puffy character which marks that of the Owls. Now and then it is seen by day; but it is half concealed in the bushy foliage of some thick tree, which it can with difficulty be induced to quit, distrustful of its powers by day. As it sits in the fading twilight it ever and anon utters a loud *ho-hoo*, and sometimes the same syllables are heard, in a much lower tone, as if proceeding from the depth of the throat." Gosse had one in captivity for several days, but it refused food and sat in the same position day and night, this position, by the way, being "quite perpendicular" and in accord with what subsequent observers have stated. Apparently the first authentic nest of this species to be described is that mentioned by Dr. E. A. Goeldi, which was found along the Rio Alpina, in southern Brazil. It was on the top of a small stump about six feet in height and less than five inches in diameter, which had been placed as a boundary mark between two plantations. The Uratoa was observed sitting bolt upright on the top of the stump, and under the bird was

found a single egg, resting on a small depression caused by decay, and without nest material of any sort. The egg was white with a few delicate violet spots on the larger end and large, irregularly distributed, brownish rufous spots over the remainder of the surface.

This bird, known to the natives of Brazil as the Uratoa, is much connected with Brazilian folk-lore on account of its mournful, wailing call, which is a constant nocturnal sound at certain seasons of the year. It is rendered by the syllables *pu-hu-hu*, slowly pronounced, but with energy, and as Dr. Goeldi adds, "is quite enough to frighten a timid wanderer in the solitary forest patches." In the island of Trinidad, according to an entertaining account given by Messrs. Brewster and Chapman, this species is called *Poor me one*, its cry being "possessed of a human quality which appeals to one as strongly as the voice of a fellow-being. Its tone is so sweet and tender, so expressive of hopeless sorrow, that even the negroes are impressed by it, as its native name, Poor-me-one, meaning 'Poor me all alone,' clearly shows." It is easily attracted by imitating its voice. Here, as in Jamaica and elsewhere, it has the habit of returning night after night to some favorite vantage point such as a stump or fence post, making short sallies for its food, which consists largely of beetles.

THE HUMMINGBIRDS AND SWIFTS

(Suborder *Micropodii*)

The present suborder comprises but two families, the *Trochilidæ*, or Hummingbirds, and the *Micropodidæ*, or Swifts.

THE HUMMINGBIRDS

(Family *Trochilidæ*)

The Hummingbirds have been called, and appropriately so, the gems of the feathered race, for of all the many groups into which birds are divided there is none other so numerous in species, so varied in form, so brilliant in plumage, and so different from all others in their mode of life. "Glittering fragments of the rainbow," as Audubon has called them, and surely they are, for their little bodies fairly glow with brilliant metallic crimson, emerald, violet, purple, blue, or golden green contrasted often with satiny white or velvety black. They vie in coloring with the bright-hued tropical flowers, among which they mostly make their homes, darting, like flashes of light, from bush to bush and flower to flower, now hovering for an instant over some bloom, then away with a speed that the eye fails to follow.

The Hummingbirds of course take their name from the humming or buzzing noise made by their rapidly moving wings, as they hang over a flower or dart through the air. As by far the larger portion of their lives is spent on the wing,

they have a prominent breast-bone which serves for the attachment of the powerful muscles moving the wings. Their feet are small and delicate, just sufficient in fact to hold them up while perching; they rarely alight on the ground.

Distribution. — Hummingbirds are confined exclusively to the New World, being most abundant among the northern Andes, and between the parallels of ten degrees north and south of the equator, from which region they diminish in numbers both to the northward and southward. Of the more than five hundred species known, nearly two hundred are found in Colombia, over one hundred in Ecuador, seventy in Central America, about fifty in Mexico, and only seventeen in the United States, while about seven species reach the southern extremity of South America. They appear to prefer mountainous countries, where, within the tropics, the character of the earth's surface and the vegetation may be widely different within relatively short distances.

Of the Hummingbirds reaching the United States only one, the Ruby-throated (*Trochilus colubris*), is found east of the Mississippi River. In summer it may be found rearing its young from the Gulf of Mexico to Canada and west to the Great Plains, while in winter it retires to southern Florida, Cuba, eastern Mexico, and Central America. The Rufous Hummingbird (*Selasphorus rufus*) is found in summer as far north as Prince William Sound, Alaska, and in winter along the tablelands of Mexico. A number of species are found in the Rocky Mountain area, but the larger number of those reaching the United States are really Mexican or Central American species found just over the southwestern border.

Nests and Eggs. — The nests of Hummingbirds are marvels of bird architecture, and the discoverer of one may count himself fortunate. They are usually deeply cup-shaped, and made of plant down fastened together with spiders' webs, while the outside is often ornamented with lichens, mosses, and rarely feathers. Usually they are saddled upon a limb and are hard to distinguish, at a little distance, from a knot or projecting piece of bark. Some kinds, however, as the Hermit Hummingbirds, fasten the nest to one side of a drooping, green leaf, and still others attach their nests to the sides of cliffs or overhanging rocks. The eggs are almost invariably two, pure white and unspotted.

Size. — The nearest relatives of the Hummingbirds are, of course, the Swifts, but otherwise there are none very closely allied to them in any part of the world. While they are all small birds, there is still considerable range in size among them, the largest being the Giant Hummer (*Patagona gigas*), found in the higher Andes, which is about eight and a half inches in length, while the smallest bird known in the world is the Fairy Hummingbird, which is a native of Cuba, its total length being only two and a quarter inches. For some time the Vervain Hummingbird of Jamaica was supposed to be the smallest bird, but it is a trifle larger than the Fairy. The nest is only about three quarters of an inch in diameter across the cavity, and the tiny eggs a little over a quarter of an inch long!

Bills. — In the matter of the length and shape of the bill there is much difference among Hummingbirds. The shortest bill is hardly more than a quarter of an inch long, while the longest is fully five inches in length, and is provided

with a tongue that may be extended nearly as far beyond its tip. Usually the bill is straight, but in one group it is curved downward until it makes a third of a circle, whence these birds are very appropriately called the Sickle-billed Hummers. In others, again, it is turned upward.

Plumage. — The plumage is likewise subject to great variation, particularly in the feathers of the tail, which are always ten in number. In many species these feathers are regularly graduated as in the Rufous-backed, or slightly forked as in the Ruby-throated; in others the outer feathers are elongated or ribbon-like, producing deeply forked tails; again, the two outer feathers are produced with a terminal enlarged portion, quite like a tennis racket, giving rise to the name of the Racket-tails. The feathers of the head and throat, which usually show the most brilliant coloring, are often curiously developed. There are crests ranging from those so short as to be hardly noticeable to those that are longer than the whole head. The throat-feathers, or gorget as it is called, are often elongated, producing frills, ruffs, or beard-like effects, the variation in these respects being almost infinite.

Habits. — Hummingbirds are usually fearless little creatures, coming boldly into the presence of human beings, or even entering houses, where after flying about for a few moments they alight on some convenient place and begin to arrange their feathers. They rarely show much fear on being handled, and within a few minutes after capture may take syrup or honey from the hand. They are also very pugnacious, darting furiously at one another, and not hesitating to attack birds as large as Crows, Hawks, or Eagles, and cases are on record, too, of their darting at the head and eyes of a person who had approached too closely to their nest. During the nesting time each pair seems to appropriate or lay claim to a certain area, and woe betide the other birds who would venture to intrude! Like a flash of light, one or both parent birds dash at the intruder until he is usually glad to beat a retreat.

Voice. — In the matter of voice the Hummingbirds play a very insignificant part. Their ordinary note is a weak twitter or squeak, quite like the notes of the Swifts, yet two or three species are known to possess a low warbling song. Thus the Vervain Hummingbird (*Mellisuga minima*), which has already been mentioned, is said to be "fond of sitting on the topmost branch of a mango or orange tree, where it warbles in a very weak, but very sweet, tone a continuous melody for ten minutes at a time." The Wedge-tailed Saber-wing (*Sphenoproctus curvipennis*) of Mexico is also said to have a distinctive though weak song, and the Costa's Hummingbird (*Calypte costæ*) of southern California, Arizona, and Mexico often gives voice to a very delicate song. Lieutenant Wirt Robinson gives the following account of the song of the Buff-breasted Hummingbird (*Doleromya pallida*) as he heard it on the island of Margarita: "On the second day after my arrival at Margarita I was hunting in the scrub when I heard the notes of a bird singing near at hand. I at first thought it was the Gnat-catcher, which was common thereabouts, but as it struck me that the song was louder than a Gnat-catcher's, I walked up quietly and, to my surprise, discovered that it emanated from a Hummingbird. It is a great mistake to think that Humming-

birds cannot or do not sing. The Alice's Hummer (*Amazilia aliciæ*) has a well-marked and strong song of three notes, repeated a varying number of times, and the little Atala's Emerald (*Chlorostilbon caribæa*) has a more varied though much weaker song, but the Buff-breasted Hummer is a nightingale compared to them. In singing they perch upon some prominent twig and elevate their beaks. The notes can be heard at a distance, and I quickly found that the easiest way to get specimens was to wait until one was heard singing and then go at once to the spot. In this way I secured some twenty and could easily have gotten many more. As among the last only two were females, I think that the males alone sing."

Fig. 167. — Racket-tailed Hummingbird, *Steganura underwoodii*.

Food. — It is popularly supposed that the food of Hummingbirds consists entirely of nectar or honey which is "gathered from every opening flower." This is not the case, for while nectar may be an important item of their food, it was established long ago that insects make up a large part of it. Alfred Russel Wallace, the great traveler-naturalist, says: "In dozens and perhaps hundreds of flower-frequenting species which I have examined, the crop, stomach, and intestines have been entirely filled with minute beetles, bees, ants, and spiders, which abound in most flowers in South America. Very rarely, indeed, have I found a trace of honey or of any liquid in the crops or stomachs." Young birds of the Ruby-throated Hummingbirds only twenty-four hours old have been dissected and found gorged with minute spiders, and many other instances might be given of their liking for insect food; in fact, there is one group of Hummers that do not visit flowers at all, but spend their lives gleaning among the leaves high up among the treetops. On the other hand, the Ruby-throated Hummingbird has lived in captivity for more than a month without insect food of any kind, having been fed exclusively on sweetened water. From the fact, however, that they cannot be kept alive beyond a few weeks when fed on syrup, it would imply that something essential was absent from their food. The attempt has been made to take them alive to England, but never successfully, as they all died within a few days after reaching there. Even taking them so short a distance as from South America to Jamaica resulted in their death.

The method of feeding the young, as observed in the Ruby-throat, is very interesting. The old bird alights on the edge of the nest and inserts her bill

in the upturned bill of the nestling, pushing it down into the stomach, until it would seem that its sharp point would pierce the youngster through and through. Holding the bill in this position for some moments, the throat of the old bird can be seen working in a way quite suggesting a pump. The food seemed to be more or less prepared and perhaps partially digested by the parent bird and then "pumped" into the young one.

Number of Species. — According to the latest authorities this vast assemblage embraces about five hundred and eighty species and subspecies, disposed among some hundred and twenty-five genera, and although there are notable differences in size, plumage, and coloration, the structural characters are so generally uniform that it is practically impossible to separate them into trenchant groups. Mr. Osbert Salvin, who elaborated the family for the British Museum "Catalogue of Birds," divides them into three not very sharply circumscribed groups or sections, — on the prominence, indistinct development, or absence of serrations on the sheath of the maxilla.

The habits of Hummingbirds are relatively uniform throughout the group, although it must be confessed the life history of very many forms is still unknown, and hence a complete account of the group could be little more than a succession of pen pictures of plumage; it is manifestly impossible in the present connection to do more than select a few examples, especially when it is borne in mind that the technical descriptions alone fill more than four hundred pages in the Catalogue above mentioned. I have, therefore, ventured to quote extensively from the charming account given by Mr. Robert Ridgway in his exhaustive paper on "The Hummingbirds":

"Among the half-thousand species of Hummingbirds, the diversity of plumage as well as form is very great. It will not be practical, therefore, to do more in the way of describing particular kinds than to select those which are most conspicuous in this respect. Before proceeding to do so, it may be well to explain that in a large majority of cases ornamentation is confined to the males alone, the females being as a rule devoid of refulgent hues and ornamental plumes, and therefore much more like one another than those of the opposite sex. Occasionally, however, the sexes are alike in color, or, at least, not essentially different. In only one species, the Mango Hummingbird (*Lampornis mango*) of Jamaica, is the female more beautiful than the male, having, in addition to the colors possessed by the latter, a brightly colored throat patch. As a rather remarkable coincidence, it may be mentioned that the largest and smallest species of the family, *Patagona gigas* and *Mellisuga minima*, are among the most plainly colored of all, with little difference between the sexes.

Marvelous Hummingbird. — Perhaps the most remarkable of Hummingbirds, though more distinguished for the extraordinary development of its tail-feathers than for brilliancy of plumage, is the Marvelous Hummingbird (*Loddigesia mirabilis*) of Peru. Its coloration, while not conspicuous for brilliancy in such a brilliant coterie, is nevertheless very pretty: crown, azure blue; back, golden green; tail, violet-black; and lower parts pure white with a gorget of emerald-green bordered on each side by a line of coppery red.

The **Topaz-throated** or **King Hummingbirds** (*Topaza*) are among the largest of the family and are further conspicuous for their elegant form and brilliant plumage. There are two species, — the Crimson Topaz (*T. pella*) of Guiana and the Lower Amazons, and the Fiery Topaz (*T. pyra*) of the northern tributaries of the great South American river. The former is much the better known and is a truly magnificent bird, some eight and a half inches in total length, although some three inches of this are taken up by the lengthened caliper-like tips of the second pair of tail-feathers. The general color is a brilliant metallic crimson, the whole throat of the most glittering, burnished golden yellow or topaz, changing to emerald-green, encircled by velvety black, which covers also the sides and top of the head.

The **Fire-tailed** or **Comet Hummingbirds** (*Sappho*) also include two species, belonging to Peru, Bolivia, and the Argentine Republic. 'The tails of the males blaze with the radiance of flashes of flame, and their ruby backs, luminous green throats, and under surface present a *tout ensemble* unparalleled in the range of ornithology,' while Mr. Gould says that the 'two species generally known under the names of *Sappho* and *Phaon* are *par excellence* the most gorgeous of birds in existence, so far as regards the coloring of their tails; and well do these living meteors deserve the more general name of *Comets*.' The tail of these birds is greatly lengthened, and, when spread, is forked. The upper surface of these feathers is burnished to a degree scarcely to be equaled by any art, and glows with a refulgence not surpassed by any gem, the glorious color heightened by contrast with the bold and sharply defined velvety black tip to each feather. In the Sappho Comet (*S. sparganura*) the red color of the tail and rump is of an orange-red or scarlet hue, while in the Phaon Comet (*S. phaon*) the color is the loveliest crimson or purple-red.

Sylph Hummingbirds. — Allied to the Comet Hummers are the Sylph Hummingbirds (*Cyanolesbia*), the tails of which are of similar form, but gloriously blue and green, shaded with violet, in one species, splendid green in another, and with black centers instead of tips. They inhabit the mountains of northern and western South America.

Ruby and Topaz Hummingbird. — So far as the coloration of the head alone is concerned, no other Hummingbird equals the Ruby and Topaz (*Chrysolampis mosquitus*). 'It is a species,' says Mr. Gould, 'which plays no inconsiderable part as an article of trade; for it is the one *par excellence* of which thousands are annually sent to Europe for the purpose of contributing to the decorations of the drawing-rooms of the wealthy, for the manufacture of artificial flowers, etc.; and well suited is it for such purposes, its rich ruby and topaz-like coloring rendering it one of the most conspicuous and beautiful objects imaginable.'

De Rham's Garnet. — One of the most beautiful of the Mexican Hummingbirds is De Rham's Garnet (*Lamprolæma rhami*). It is a large species, four and a half inches long; green above; throat, metallic solferino or garnet; breast, rich metallic violet-blue; the tail, which is very broad and slightly forked, being of a violet-black hue.

Saber-wing. — Scarcely less beautiful and considerably exceeding it in size

FIERY TOPAZ HUMMINGBIRD
(*Topaza pyra*)

is De Lattre's Saber-wing (*Campylopterus hemileucurus*), a species which extends from northern Mexico to Panama. It is of a uniform rich, metallic, violet-blue color; rump, green; and the tail, white and black in nearly equal proportion. A South American congener of this species is the Splendid Saber wing (*C. villavicencii*), which has the crown glittering golden green changing to coppery red; the throat and breast, glittering blue; and the other portions chiefly dark green.

Irazú Hummingbird. — Undoubtedly the most brilliant of Central American Hummingbirds is that curious local species which is confined to the higher slopes of a few of the volcanic peaks in Costa Rica and Veragua, and is known as the Irazú Hummingbird (*Panterpe insignis*). In this the crown is rich metallic blue; the upper parts bronzy green, changing to blue on the upper tail-coverts; the breast is also blue, but the whole chest and throat are of the most glowing hues, commencing with golden green exteriorly and passing through golden yellow into orange and finally culminating in scarlet in the center.

The **Puff-legs** (*Eriocnemis*) are beautiful Hummingbirds of medium size, which have the legs clothed with the daintiest muffs or puffs imaginable of cottony or downy feathers, white, buff, brown, or black, according to the species. Perhaps the finest of them is the Glowing Puff-leg (*E. vestita*), whose upper tail-coverts are of a dazzling brilliancy unsurpassed and seldom, if ever, equaled by any other object in nature. Mr. John Gould, the celebrated author of that most magnificent of all bird books, the 'Monograph of the Trochilidæ,' says: 'Every one who, for the first time, finds himself in front of the compartment of my collection in which this species is placed, gives utterance to some exclamation expressive of the admiration excited by its striking beauty and glowworm-like splendor of its upper tail-coverts. This brilliancy is more apparent at certain hours of the day; for instance, it is more beautiful in the evening after sunset than at midday, the brilliancy being relieved by the dark hue of the tail-feathers. It is unquestionably one of the finest species of the genus and one of the most resplendent of the *Trochilidæ;* would that it were possible for me to even faintly depict it! But no, the most finished drawing can be but a phantom of the original, and it is only by an examination of the specimen that my readers can form any adequate idea of the splendor and beauty of this gem; and how much more gorgeous must the bird appear in its native wilds.'

These are the mountain valleys of Colombia.

Jardine's Hummingbird. — Even more beautiful in the writer's opinion is a gloriously colored Hummingbird found in eastern Ecuador, the *Panoplites jardinei;* for while the gorgeous coloring of the Glowing Puff-leg is mainly confined to a limited area, that of Jardine's Hummingbird embraces its entire body. The crown and lower parts are richest metallic violet-blue; the sides of the breast, the back, and the rump, bluish emerald-green; and the wing-coverts golden green. It is the excessive refulgence of the two hues of green, however, which gives the plumage of this bird such a splendid brilliancy, for, in certain lights, they glow with more than metallic clearness, while the deep, velvety black of the nape and the snowy white of the tail-feathers heightens the

effect by their striking contrast. 'The accompanying plate,' says Mr. Gould, 'is intended to represent one of the most beautiful of the *Trochilidæ* yet discovered. I say intended, for whatever success may have attended my attempts to convey an idea of the beauty of these living gems, I must confess that the means at my command are utterly inadequate to do justice to the present species, whose crown, back, shoulders, and chest-sides are clothed with hues of metallic blue and green of such resplendent brilliancy that it is quite impossible to represent them on paper.'

Princess Helena's Hummer. — Of the West Indian Hummingbirds the most exquisite is Princess Helena's Hummer (*Calypte helenæ*) of Cuba. This is the very smallest of known birds, being even less than the *Mellisuga minima* of Jamaica and Haiti, which has hitherto enjoyed the distinction of being considered the smallest of existing birds. Princess Helena's Hummingbird is rich metallic blue above (a very unusual color in this family) and white beneath, the entire head, including the gorget with its ruff-like lateral projections, being the most beautiful metallic rose-red or crimson.

Purple Carib. — A much larger species belonging to the Lesser Antilles, the Purple Carib (*Eulampis jugularis*), however, contests the claim of the little Cuban gem to be considered the most richly colored of Antillean Hummers. The Purple Carib has the upper parts velvety black, except the wings and upper tail-coverts, which are of a burnished bluish green hue, while the throat and breast are of a rich garnet-purple.

Long-tailed Hummer. — The most remarkable, however, of the West Indian Hummingbirds is the Long-tailed Hummer (*Aithurus polytmus*), which Mr. Gosse styles 'the gem of Jamaica Ornithology,' adding that 'its slender form, velvet crest, emerald bosom, and lengthened tail-plumes render it one of the most elegant even of this most brilliant family.'

Mountain Nymph. — A truly noble Hummingbird is the Mountain Nymph (*Oreonympha nobilis*) of the Peruvian highlands, a bird approaching the Giant Hummer (*Patagona gigas*) in size, but otherwise not to be compared with that somberly clad species. The Mountain Nymph is about seven inches in length, of which about half is taken by the deeply forked but broad-feathered tail. The forehead and side of the head are black, the rest of the head dark blue; the throat is metallic emerald-green, the lower portion ornamented by a beard-like tuft of lengthened feathers of a rich metallic reddish purple. The upper parts of the body are bronzy, the lower parts white.

Coquettes. — The most elaborately decorated Hummingbirds belong to the group known as Coquettes (*Lophornis* and *Polemistria*), on account of their frilled, ruffled, and bespangled plumage, their ornamentations being confined to the head and neck. There are about ten species (of which all but three occur only south of the Isthmus of Panama), the most beautiful of which is, perhaps, the Frilled Coquette (*L. magnificus*) of Brazil. In this there is a fan-like ruff or frill on each side of the neck of snowy white, but each feather tipped with a crescent-shaped bar of glittering green; the crest, of pointed feathers, is rich chestnut or rufous, while the throat and forehead are emerald-green.

Hardly so beautiful but more curiously adorned is Princess Helena's Coquette (*L. helenæ*) of Mexico and Central America. In this the Lapwing like crest is green, the throat glittering green set in a black border; from each side of the occiput spring three long hair-like black plumes, while on each side of the neck is a tuft or ruff of black feathers streaked with buff.

The Adorable Coquette (*L. adorabilis*) inhabits parts of Costa Rica and Veragua. It has the forehead dull ruby-red or copper-color, the very pointed crest snow-white, and a tuft of pointed feathers on each side of the head greenish black.

The Spangled Coquette (*L. stictolophus*) has a very conspicuous, almost fan-shaped crest of a bright rufous color, dotted or spangled with emerald green.

The Frilled Coquette (*L. ornatus*) has the forehead and throat rich metallic green; the crest of pointed feathers, chestnut; and from each side of the neck project lengthened narrow feathers of a rufous color, each with an expanded tip of metallic green.

The Coquette Hummingbirds are all of small size, most of them less than three inches long, and none of them much over that length, and, together with the genera *Popelairia* and *Discura*, constitute a strongly marked group or section of the family, strikingly characterized by the presence, in both sexes, of a distinct band of white or buff across the rump, a feature wanting in all other genera.

The **Sun-gem** (*Heliactin cornuta*) of Brazil is one of the most curious as well as beautiful of Hummingbirds, and is furthermore unique in both form and plumage. The tail is long and wedge-shaped, and the head is ornamented by a flattened tuft of broad imbricated feathers springing from each side of the occiput, the color of these tufts being a glowing metallic scarlet, passing into golden yellow at the tips. The forehead and crown are shining greenish blue, the throat velvety black, the rest of the under parts mostly white, and the upper parts bronzy green — certainly not a very extraordinary coloration for a Hummingbird; but in the flattened head-tufts mentioned, there seems to be concentrated enough splendor of color to make up for the absence of brilliancy from the rest of the plumage, and quite justifying the name which has been given the bird.

Snow-caps. — In the mountains of Veragua and Costa Rica dwell two little Hummingbirds called 'Snow-caps' (*Microchera*), which are altogether unlike any others in their coloration. The whole top of the head is snow-white, while the rest of the plumage is rich plum-purple (in *M. parvirostris*) or blue-black (*M. albicoronata*). This coloration is remarkable for its chaste simplicity, and the little creatures which wear it, hardly half as big as our Ruby-throat (*Trochilus colubris*), are certainly unique in their dainty loveliness."

THE SWIFTS

(Family *Micropodidæ*)

To the unpractised eye the Swifts, of which our common Chimney Swift may be taken as a typical example, would seem to be very closely related to the

Swallows, with which, indeed, they were placed by the early writers. They have the same general form and much the same habits of life, but anatomy teaches us that the resemblance is merely superficial, and that no real relationship exists between them. Without unduly anticipating, it may be mentioned that the Swallows have invariably twelve tail-feathers as against ten in the Swifts, and a very different vocal apparatus, since they belong to the so-called singing birds, though it must be confessed that their powers of song, with a few exceptions, hardly exceed those of the present group.

To further particularize, the Swifts are small, preëminently aërial birds, with very long, pointed wings in which there are ten primaries and always less than nine secondaries. The bones of the wings are naturally peculiar, there being a very short humerus, a longer forearm, and an extremely long hand, while the tarsi are extremely short and the feet weak, since they very rarely alight upon the ground or perch, except at night. The skull and breast-bone are very characteristic, the former being broad and flat, with the mouth split to beneath the eyes, the bill being short, broad at base, and somewhat curved, thus giving a very wide gape. The palate is of the ægithognathous type, and the basipterygoid processes of the base of the skull are absent. The breast-bone may be known by its very high keel and unnotched front margin. A further peculiarity of the foot is worthy of mention. In the true Swifts (*Micropodinæ*) the middle and outer toes possess only three joints, and all four toes are directed forward, while in the other groups the toes are normal as regards the number of joints and the hind toe is directed backward, or is at least reversible, that is, may be turned either way. The plumage, which is moulted but once annually, possesses a small or moderately large aftershaft, and the naked tracts are provided in the adults with a blackish down; the young when hatched are naked, blind, and helpless.

About one hundred species and subspecies of Swifts are known, and like their analogues, the Swallows, they are practically cosmopolitan, being found through the entire world except at the extreme north and south, where the supply of insect food necessary to their existence is not forthcoming. They are in general dusky, greenish black, or mouse-brown birds, though this unpretentious coloration is not infrequently relieved by a white chin, throat, or rump. Their chief charm lies in their marvelous power of flight, being perhaps unsurpassed in this respect by any other birds. The flight is accomplished by two or three rapid beats of the wings, succeeded by a gliding movement, and like a flash they go, now skimming the surface of land or water, now wheeling and circling aloft with the lightness of down, or vanishing to mere specks in the sky. Not only is the flight swift and powerful, but it can be sustained almost indefinitely and without apparent effort. Hundreds of miles are often covered during the hours of daylight in their passing between nesting site and feeding ground. While they are not exactly gregarious, many are often seen in company, and most of the species nest in colonies often of vast size. They are completely insectivorous, capturing all of their food on the wing. Their nests are among the curiosities of bird architecture: some are composed entirely of saliva secreted by the birds themselves, as will be described later; others are made of fragments of bark,

sticks, twigs, leaves, seeds, and, in some species, bits of paper, and all are cemented together by saliva and fastened to the walls of caverns, hollow trees, chimneys, or to the branches of trees. The number of eggs varies in different species from one to as many as six, a very common number being two; they are always immaculate white. The notes of the Swifts are rather harsh, monotonous, and unmusical chatterings.

Typical Swifts. — There are differences of opinion as to the proper division of the family,[1] and, as Mr. Lucas well says, "The precise status of the Swifts may well be called a little uncertain," but for present purposes it may be well to stick to the usual arrangement which separates them into three subfamilies. In the first of these (the *Micropodinæ*) the tarsus is distinctly feathered, and, as already mentioned, the outer and middle toes are provided with only three joints. The largest genus (*Micropus*), and the one giving the name to the subfamily, embraces about twenty-five forms which are of almost world-wide distribution though not present in North America. They are sooty black or mouse-brown birds, often with a metallic gloss and a white rump or white collar, and a single species has the sides of the neck white. One of the best-known species is the Common Swift, Develing, or Screecher (*M. apus*), as it is sometimes called in England, a bird about seven and a half inches in length and sooty black, with a slight greenish gloss throughout except for a dusky white chin. It is common throughout the whole of Europe in summer, spending the winter months in Africa. In England, where it is a familiar and well-known bird, it arrives in late April or early May, and, says Mr. Hudson, "Year after year the Swifts return to the same locality to breed, and there are few towns, villages, hamlets, or even isolated mansions and farm-houses where this bird is not a summer guest." It is extremely energetic, spending not only all the hours of daylight on the wing but far into the night its "exulting cry may be heard at intervals now far off, and now close at hand," pursuing its mad, everlasting race through the air. It frequents old towns, ruins, steeples, chimneys, and rocks, and although its notes are usually described as a harsh, prolonged scream or screech, they are not wholly without attractiveness. The nest, a somewhat rude cup-shaped affair of straws, moss, hair, feathers, etc., glued together by a salivary secretion, is placed in a hole in a church tower or house, under the eaves of a thatched cottage, in a cranny in a cliff or exceptionally in a hollow tree. The eggs are two in number and but a single brood of young is reared in a season. Paler subspecific races of this occur to the south and east.

Alpine Swift. — The largest member of this genus is the Alpine Swift (*M. melba*) of southern Europe, northern Africa, and western Asia, a bird eight and a half inches long, mouse-brown in color but with a white throat and abdomen. It is a gregarious species and one of the most powerful flyers among birds, roosting and breeding in communities in buildings and rocky cliffs, and flying enormous

[1] In an article published a few years ago Mr. F. A. Lucas proposed to raise the group of Swifts to a superfamily (*Micropodoidea*) and to then divide it into two families, the *Micropodidæ* and the *Dendrochelidonidæ*, on purely anatomical grounds, but lack of sufficient material makes it seem on the whole best to retain the older arrangement, at least for a time.

distances, often hundreds of miles, each day hawking for insects. The nests, which have walls nearly an inch thick, are constructed of straws, grass stems, feathers, etc., firmly cemented together with saliva; the eggs number three or four.

White-throated Swift. — Closely resembling the last genus, but differing in having feathered instead of unfeathered toes, is the monotypic *Aëronautes*, which includes only the White-throated Swift (*A. melanoleucus*) of the western United States. It is a handsome species six and a half inches long, dull blackish above and on the sides, and white on the lower parts as well as the tips of the secondaries and the sides of the rump. The tail is slightly forked, but the feathers are not sharp-pointed, which serves to distinguish them from those next to be considered. The White-throated Swift breeds throughout the Rocky Mountain region as far north as Montana, frequenting the higher ranges or their immediate vicinity, where alone it finds suitable nesting sites, and as it has the habit of flying very high and with extreme velocity and rarely descending into the valleys and canyons, it is not often observed. It nests in caves and crevices in the face of precipitous cliffs, constructing a nest similar to that of a Chimney Swift, though made of weed stalks instead of twigs and lined with feathers; the eggs are four or five in number and dull white.

Feather-toed Swifts. — Distinguished by a more deeply forked tail, the outer feathers of which are very sharply pointed, and by the loose, soft, and silky plumage are the Feather-toed Swifts (*Panyptila*) of Central and South America, chiefly remarkable for the marvelous construction of their nests. The smaller of the two species (*P. cayanensis*) is a little less than five inches in length, in coloration being deep blue-black, with chin, throat, neck collar, and rump patches of white; it ranges from Nicaragua to Guiana and Brazil. Its nest, which is attached to the under side of a projecting limb of a large tree, is said to be similar in construction to that of the other species (*P. sancti-heironymi*) which being better known will only be described. The latter species, which appears to be confined to Guatemala, is colored exactly like its relative, from which it differs in being nearly twice its size. It constructs a curious tubular nest often more than two feet in length and six inches in diameter, made entirely of the seeds of plants fastened together by the birds' saliva and attached to the under surface of an overhanging cliff. The entrance is from the lower end and the "eggs are placed on a kind of shelf at the top." This form of nest has probably resulted as a means of protection against enemies.

Palm Swifts. — With the toes disposed in pairs, the outer and middle ones being directed to the right and the inner and hind ones to the left, are two genera of Palm Swifts, so called from their frequenting palm trees, where they attach their nests to the under surfaces of the drooping leaves. The genus (*Tachornis*) embraces five species, all small birds, mostly with deeply forked tails and brownish or blackish plumage, which spread from the Greater Antilles over most of Africa, the Indian peninsula, and the Indo-Chinese countries to Borneo and Java. They construct tiny nests of cottony down and feathers agglutinated to the leaves of palms or the grass-thatched roofs of native huts, and lay two or sometimes three small white eggs.

American Chimney Swift. — In the remaining subfamilies as here described the toes possess the normal number of phalanges and the tarsi are unfeathered. The largest of these (*Chæturinæ*), which includes the bulk of the Swifts, is known by the short, even, or slightly forked tail and the long wings which always extend far beyond its tip. Of the three genera in this subfamily, *Chætura*, with its thirty-five species, is distinguished by having the shafts of the tail-feathers stiff and spiny, which serve to support the birds when they perch, as do the stiff tails of their not distant relatives the Woodpeckers. The Spine-tails, as the members of this genus are often called, are very widely disposed over the globe, among them being our common Chimney Swift or "Chimney Swallow" (*C. pelagica*), as it is perhaps most frequently denominated. Too well known to need further description, it is a common bird throughout North America east of the Plains, nesting from the Gulf coast to central Canada, and wintering somewhere south of the borders of the United States, the exact locality being at present unknown. Before the country was settled by Europeans, the Chimney Swift nested in hollow trees, and occasionally it still does so, as nests have recently been found in the great hollow cypress trees in the Dismal Swamp of Virginia and other places, but with the advent of chimneys the hollow trees were mostly abandoned and now almost every unused chimney has its quota of these summer visitors. The nest is a half saucer-shaped affair, composed of small twigs firmly glued together and to the support by the saliva of the birds. As the Swifts rarely, perhaps never, alight on the ground, and never on trees, the manner in which they gather the twigs has been the subject of considerable discussion. By some observers it is contended that they "sweep on the coveted twig" much as a Hawk rushes on its prey, parting it at the desired place and bearing it away to the nest in the feet; but, as the following account explains, it appears that the twig is secured by the bill while the bird is in rapid flight. "A number of Chimney Swifts were observed flying rapidly at and among the branches of a dead peach tree. By concealing myself while the birds were absent, it was possible to get within twenty feet of any part of the tree. After waiting perhaps five minutes the birds returned and began circling about. A Swift would retire for a distance of fifty or one hundred yards, then come toward the tree at a rather slow rate, sailing, without moving the wings for the last twenty or thirty feet and at a slight downward incline until within five feet of the tree, then turn upward, which had the effect of slightly retarding the movement, at this instant grasping a twig in the bill and giving a number of rapid beats of the wings, which carried the bird through the branches and beyond the tree. These tactics were repeated again and again, or until the twig was secured. They did not appear to select any particular twig and fly repeatedly at it, but simply flew back and forth among the branches, trying the nearest at hand at the instant, and either securing it or passing on to return from the opposite side of the tree."

The nests, of which there may be from one or two to fifty or a hundred according to the size of chimney or tree, are very securely cemented together and to the support,—in fact, Dr. Brewer records the fact that when separating the nest from the side of the chimney he has frequently found that the brick to which it was

fastened gave away sooner than the cement with which it had been secured. The eggs number from three to five and but a single brood is reared in a season.

Vaux and Needle-tailed Swifts.—The only other North American member of the genus is the rare Vaux Swift (*C. vauxii*) of the western United States, chiefly beyond the Rocky Mountains, which is similar to the Chimney Swift, but smaller and paler. The habits are also similar, except that most of them still continue to employ the hollow trees for nesting sites. Of the Old World species, mention may be made of the Needle-tailed Swift (*C. caudacuta*) of eastern Asia, which spends the winter in China, Japan, and even Australia, and has twice strayed as far as England. It is a gregarious species, nesting in communities in holes in rocks, cliffs, and hollow trees, and is said to have a weak, Swallow-like note.

West Indian and Black Swifts.—In the second genus (*Cypseloides*), although the feathers of the tail are somewhat pointed, they are not so stiff or spinous as in the last, and the plumage is of uniform color or sometimes with a collar of rufous in the male; the seven forms are all natives of the New World and particularly of northern South America. The West Indian Swift (*C. niger*), a bird about six inches in length, is blackish brown throughout with a slight, metallic reflection and paler throat and forehead. A similarly colored but larger form (*C. n. borealis*) is our Black or Cloud Swift, which ranges through the mountains of Central America and western North America to British Columbia, but is of very local distribution within our borders. They are extremely sociable birds, rarely seen singly even during the breeding season, and frequent high, precipitous cliffs mostly among the lofty mountain ranges. It is a rather silent bird at all times, and never alights on the ground. Its nest and eggs appear to be unknown.

Swiftlets.—The pygmies among the Swifts are the so-called Swiftlets (*Collocalia*), some of which are perhaps better known as the manufacturers of the famous edible birds' nests which are so highly esteemed as an article of food in certain eastern countries. They are, as implied by the name, small birds, none exceeding five inches and some falling under three and a half inches in length, mostly of a sooty black and brownish color, often lighter below, with a light or even white rump band. There are, according to a recent revision by Oberholser, upward of thirty forms, all of Old World distribution and ranging from the Indian and Malay countries through the Papuasian and Pacific islands to Australia and the Fiji Islands and west to the Mauritius and Seychelles. As they are resident wherever found, there has been a tendency to develop into local races. It was formerly supposed that the nests, which were attached to the walls of caverns, were made of algæ or minute seaweeds which had been partially digested by the birds, but it is now known that the best quality of nests are composed entirely of mucus which is secreted by the large glands in the throat. Not all of the species produce edible nests, as some do employ mosses and other plants in their construction, and when the edible species have been robbed of the first and second nests, the supply of saliva seems to give out and vegetable

Fig. 168. — Gray-rumped Swiftlet, *Collocalia francica.*

substances are then employed to such an extent as to render them nearly or quite worthless for food. According to Hume, the best quality of the birds' nests of commerce are produced by the little Gray-rumped Swiftlets (*C. francica*)

and its subspecies of the Pacific and Indian islands, the Malay Archipelago, the Andaman and Nicobar islands, etc. These are nearly pure white where attached to the walls of the cave. The nests of a Javanese Swiftlet (*C. fuciphaga*), a very widely distributed species, are also edible and furnish a large part of the supply of commerce.

The caverns in which the Swiftlets nest are often of vast size and are resorted to by countless thousands of birds. The following interesting account of a visit to Simud Putih or White Cave of northern Borneo is given by Mr. H. Prior, who observed them about twenty years ago. The species is that last mentioned. "The entrance is about forty feet high, by sixty feet wide, and descends very steeply, widening out to great size and having a perpendicular unexplored abyss at its farthest point. . . . At a quarter of six (P.M.) the Swifts began to come into Simud Putih; a few had been flying in and out all day, but now they began to pour in, at first in tens and then in hundreds, until the sound of their wings was like a strong gale whistling through the rigging of a ship. They continued to fly in until after midnight, as I could still see them flashing by over my head when I went to sleep. As long as it remained light I found it impossible to catch any with my butterfly net, but after dark it was only necessary to wave the net in the air to secure as many as I wanted. Nevertheless, they must undoubtedly possess wonderful powers of sight to fly about in the dark in the darkest recesses of their caves, and to return to their nests, often built in places where no light ever penetrates.

"In this cave I saw the nest gatherers at work getting in their crop. A thin rattan ladder was fixed to the end of a long pole and wedged against the rock; two men were on the ladder, one carried a long, four-pronged spear, a lighted candle being fixed to it a few inches below the prongs. A slight twist detaches the nest unbroken from the rock; the spear is then withdrawn until the head is within reach of the second man, who takes the nest off the prongs and places it in a pouch carried at the waist. The nests of best quality are bound up into packets with strips of rattan, the inferior being simply threaded together; the best packets generally weigh one catty (1⅓ lb.), averaging forty nests, and are sold at $9 each, the annual value of the nests gathered being $25,000. These caves have been worked for seven generations without any diminution in the quantity; three crops are taken during the year.

"The white nests are supplied entirely by the inspissated saliva of the bird, and are the first produced. These are taken and sold for their weight in silver. The next made by the birds are mixed with rootlets, grass, etc., and often show traces of blood, from the efforts of the birds to produce the saliva. They are esteemed second quality. The third nest is composed of extraneous substances cemented together and to the rock with a little saliva; these are generally left for the bird to breed in, and are usually destroyed at the end of the season, to compel the birds to build fresh white ones."

Dr. W. L. Abbott visited some small caves on Little Nicobar Island which were resorted to by the Linchi Swiftlet (*C. linchi affinis*). "The longest cave," he says, "was sixty feet long by five feet broad and seven to ten feet high. The

nests were at the farther end, thickly clustered upon the roof and the upper parts of the walls. The nests were often so close to one another that the edges were adherent, three or four nests being stuck together in one mass."

The Swiftlets appear to normally lay two eggs, and when a greater number are found in a nest, as is sometimes the case, they are probably the product of two birds.

Tree Swifts. — The pretty Tree or Crested Swifts, of which some seven species are known, make up the third group of Swifts (*Macropteryginæ*). They are mostly somewhat larger birds as Swifts go, ranging between six and a half to some thirteen inches in length, and are distinguished in a number of marked particulars from the other members of the family. Among other points it may be mentioned that the sexes are different in plumage, and the coloring of the young is quite different from that of the adult. They are provided with a feather crest on the head and have the outer tail-feathers very much elongated, while the entire plumage is softer than in the other Swifts. They are found from India throughout the Malay Archipelago and Papuasia, and take the best-known of their common names — that of Tree Swifts — from the fact of their nesting in trees. They do not, however, nest in holes in trees, but build a frail nest of bits of bark, cemented together by the birds' saliva and attached to the side of a small, usually dead limb often less than one inch in diameter. "Against the side of this the nest is glued, so that the upper margin of the nest is in a line with the upper surface of the branch. The nest itself is half of a rather deep saucer, one and three-quarter inches in diameter, and about one-half inch in depth internally." Only a single egg is laid and this a rather large one, being white, without gloss.

Of the habits of the Indian Crested Swift (*Macropteryx coronata*), Mr. Hume says it is commonly seen in small parties about groves and pieces of water in or near forests, flying elegantly but not very rapidly and often perching on dead limbs or at the tops of trees. It has a peculiarly Parrot-like call, and makes the usual minute saucer-shaped nest, only about one and a half inches in diameter, of flakes of bark and sometimes a few feathers. The nest is so small that it is seen with difficulty and the Swift sits on the branch with its body over the nest. Our illustration shows the Malay Crested Swift (*M. longipennis*), with its tiny nest and egg; it is a native of the Malay Peninsula.

THE COLIES

(Suborder *Colii*)

The little group of African birds known as Colies or Mouse-birds has fared variously at the hands of systematists. At one time they were thought to belong to the passerine group and to be related to the Tits, which they do somewhat resemble outwardly; but later when their anatomy came to be more carefully examined, their affinity was deemed to be closest with the Plantain-eaters, and finally they have found a present resting place among the Roller-like birds, with

the Swifts and Hummingbirds on one side and the Trogons on the other. The fact appears to be, as Dr. Murie long ago suggested, that they present so many remarkable features and combinations of characters, that their supposed affinity with this or that group depends upon which set of characters is given prominence, though the recent studies of Mr. Pycraft seems to have demonstrated pretty conclusively that their affinities are really with the *Micropodii*. They are small birds, about one foot in length, of which the very long tail takes up a considerable part, with particularly tough skins and a short, dense plumage which makes them appear even smaller than they really are. They have crested heads, stout, quite Finch like bills, a relatively long tarsus, and four slender-

Fig. 169. — Long-tailed Coly, *Colius macrourus*.

clawed toes, all of which are directed forward, although it appears that the first toe may be reversible. The wings are short and rounded, with ten primaries, while the tail of ten feathers has the central pair greatly elongated and the outer pair much reduced. Of the anatomical characters it may be mentioned that they have the palate of the bridge (desmognathous) type, no cæca, a sternum with four notches on the posterior margin, and a tufted oil-gland.

The suborder embraces but a single family (*Coliidæ*), and the fourteen known species are all contained in the genus *Colius*. They are birds of the forests and wooded districts, especially where there is thick brush, going about except during the breeding season in small parties of six to ten individuals. They have a weak though tolerably rapid flight, which is accomplished by many quick beats of the wings, and in the trees they are very active, creeping about among the branches like Parrots, and often hanging with the head downward. At night certain of the species are said to sleep in this seemingly awkward position or con-

gregated together in bunches. Writing of the White-backed Coly, Mr. Artmore states that he once fired into such a sleeping cluster and killed twenty-five. Their food consists almost entirely of fruits of various kinds, but in times of scarcity they are said to accept such insect food as offers. The nests are usually placed in the center of a dense bush, especially a mimosa bush, and are quite well made structures of sticks and fine roots and lined with wool or similar substances. The eggs, three or four in number, are white, sometimes somewhat streaked with brown. The voice of the Colies is harsh and unmelodious.

According to Sharpe, the genus *Colius* may be divided into three groups of species, in the first of which the mantle and back are brown, vermiculated with dusky bars, and the tail brown or ashy brown. In the second group the mantle and back are gray, with the center of the lower back white and the tail gray, while in the third group the upper parts are ashy or lavender brown, with the rump and lower back bluish and the tail greenish or bluish gray. The species are largely distinguished by the color markings of the bill. The species selected for illustration is the Long-tailed Coly (*C. macrourus*).

THE TROGONS

(Suborder *Trogones*, Family *Trogonidæ*)

The Trogons constitute a very well marked group of beautiful plumaged birds, ranging throughout the American tropics and occurring also in Africa and Asia. This peculiar distribution might be difficult of explanation were it not for the discovery of a fossil Trogon in the Miocene of France, making it probable, as Dr. Wallace has suggested, that these birds enjoyed a much wider distribution during the exceptionally mild period which prevailed in the Northern Hemisphere in Miocene times and may then have ranged over much of Europe and North America, but were pushed toward the tropics by the increase of cold, which has since prevented their intermingling. They are small birds, mostly under twelve inches in length, with a short but strong, wide, and somewhat curved bill, the tip of which is hooked, and in many forms the edges of the mandibles are more or less serrated. The rather pointed wings are of moderate size and contain ten primaries, and the beauty of some of the forms is greatly increased by the elongation of the upper coverts. The tail of twelve feathers is relatively long and often beautifully colored, while in a few species the upper tail-coverts are as long as or even longer than the tail itself, producing, as will be mentioned later, some very striking forms. The skin in Trogons is exceedingly tender, and the feathers, which are provided with a large aftershaft, are attached so lightly to the skin that they are easily dislodged, thus making it a difficult matter for the taxidermist to preserve them. But the most marked peculiarity, and one which serves to distinguish them from all other birds, is the structure of the foot. The tarsus is short, and the comparatively small and weak foot is "yoke-toed," that is, with two toes in front and two behind, as in Woodpeckers, but unlike these

latter birds it is the first and second, instead of the first and fourth, toes that are directed backward. The manner in which the toes are supplied with tendons is also peculiar. While this arrangement of the toes theoretically adapts the Trogons for climbing after the manner of Woodpeckers, they are really never so used, being only employed for perching. Of the other characters which pertain to the Trogons it may be mentioned that the palate is of the split (schizognathous) form, the blind appendages to the intestines are present, and the oil-gland is naked, while there are no down feathers.

For the most part Trogons are birds of the densest forests, where they seek the upper parts of the highest trees, rarely coming down to the lower branches and almost never visiting the ground, although Dr. Richmond mentions one species observed by him in Nicaragua that seemed to prefer the borders of the forests, and on one or two occasions was seen quite a fourth of a mile from the nearest forest, and he also states that on one occasion one of these birds flew into his house. Their flight while rapid is rather weak and is not usually extended for any great distance. When the flight is for some distance it is an undulating motion after the manner of Woodpeckers or our common Goldfinch. They are on the whole rather solitary birds and even when mated the members of a couple are often separated by a distance of fifty yards or more. They often remain motionless for a long time, and when alighting on a large branch are said to sink down until the bright color of the lower part of the body is concealed, and as the green of the upper parts harmonizes with the surrounding foliage it is often a matter of difficulty to detect them. The food habits of the American Trogons are quite different from those of the Old World, the former subsisting almost entirely on fruits of various kinds, which they secure in large part while on the wing, fluttering before the fruit like a Flycatcher, or if it is not easily detached they may alight on the branch and taking the coveted fruit in their bill they pull backward with a great fluttering of the wings until it is secured. They also take insects, but only to a limited extent, while the Old World forms appear to subsist largely on an insect diet, most of which is secured on the wing, but they also take caterpillars. The nesting habits of the Trogons are very simple, since they apparently all nest in hollow trees, either selecting a natural cavity of suitable size or to some extent excavate one in soft, rotten wood. The eggs, usually three or four in number, are so far as known pure white or pale bluish, and deposited on the chips and rotten wood at the bottom of the cavity.

The suborder *Trogones* includes but one family, the *Trogonidæ*, and the sixty species are disposed among ten genera, one of which (*Archæotrogon*) is fossil. Tropical America is the center of distribution since fully two thirds of the species are found there, among them the so-called typical Trogons (*Trogon*) to the number of twenty-five forms. There seems to be little or no structural difference between the American and Old World forms, although, as above pointed out, their habits appear to differ somewhat.

Quezal. — Beyond doubt the most beautiful of all the Trogons and by many regarded as the most beautiful bird of the Western Hemisphere, if not the most beautiful of all birds, is the splendid Quezal (*Pharomacrus mocinno*) of Central

America from Guatemala to Panama. In the first place it may be stated that the feathers of the head are elongated and form a laterally flattened crest, while the middle wing-coverts are lengthened into graceful drooping plumes, and the upper tail-coverts are so enormously developed that the central pair of feathers are more than four times the length of the tail. In color, the feathers of the head, chest, back, lesser and middle wing coverts, rump, and upper tail-coverts are a bright metallic green washed with golden, and changing in certain lights to blue, while the breast, abdomen, and under tail-coverts are a rich vermilion inclining to crimson, the primaries, secondaries, greater coverts, and the three central pairs of tail-feathers are black and the outer pairs are white. The females are plainer and lack the greatly elongated train.

From their great beauty these birds are much sought after and are much more numerous in collections than almost any of the other Trogons, although they have rarely been seen or taken by naturalists, the majority falling under the blow-guns of the natives. One of the best accounts is by De Lattre, who found them in the Department of Vera Paz, Guatemala. Securing the services of two experienced Quezal hunters, they started for the forest and were soon informed that a bird had been calling. He says: "I hurried up, sat down on my wide-awake in most approved style close to Cipriano, who was calling the bird, and waited, all eyes and ears, for the result. I had not long to wait; for a distant chattering note warned us that the bird was on the wing, and a moment afterward there sat on a bough not twenty yards before me a splendid male, a sight that alone made up for all the toil and disappointments of the previous days. Cipriano wanted to creep up to within shot, but I kept him back, not wishing to lose such an opportunity of watching the actions of this grand bird in its natural state. It sat, as other Trogons do, almost motionless on its perch, the body remaining balanced upon its tiny feet in the same position, the head only being moved occasionally in a slow, deliberate way from side to side. The tail was not suspended quite perpendicularly, but hung at an angle of as much as 15° to 20° to the vertical line, and was jerked open and closed again suddenly every now and then, causing the lovely pendent tail-coverts to vibrate gracefully as they swayed in the air. I had not seen all; for a ripe fruit caught the bird's eye, and in a moment he sprang from his perch, all life and activity, plucked the berry and returned to his resting place. This performance displayed the gorgeous coloring of this bird to the greatest possible advantage. . . . The cries of the Quezal are various. They consist principally of a low double note, *whe-oo, whe-oo,* which the bird repeats, whistling it softly at first and then gradually swelling it into a loud but not unmelodious cry. This is often succeeded by a long note, which begins low, and after swelling dies away as it began. Both these notes can be easily imitated by the human voice. . . . The flight of the Quezal is rapid and straight, the long tail-feathers, which never seem to be in his way, streaming after him." It is during the months of February, March, and April that the birds are in full plumage. The eggs, supposed to be only two in number, are of a greenish blue color, the only departure from the rule of white eggs in the family so far as known. The five other species of the genus are

closely allied and inhabit the forest regions from Colombia and Venezuela to Ecuador and Peru.

True Trogons. — Passing hastily over three genera, each with a single species, one of which (*Euptilotis neoxenus*) inhabits the mountains of western Mexico, another (*Tmetotrogon rhodogaster*) the high mountains of the interior of Santo Domingo, while the last (*Prionotelus temnurus*) is confined to Cuba, we come to the principal genus (*Trogon*), which embraces the so-called true Trogons. This genus is distinguished at once by the fact that the central pair of tail-feathers is different in the two sexes, being bronze-green, blue, or purple in the males, and chestnut-gray or blackish in the females. As further characters it may be mentioned that the upper tail-coverts are not elongated as in the Quezal, and the upper mandible is more or less toothed behind the subterminal notch. They are quite handsome birds, the males having the upper parts mostly metallic blue or green, the breast bronze or bluish green, and the lower abdomen blood-red, orange, or yellow, while the females are olive-brown or gray above. These Trogons are mainly confined to Central and South America, the only species ranging far enough north to reach the United States being the Coppery-tailed Trogon (*T. ambiguus*), which comes to the valley of the lower Rio Grande in Texas and the mountains of southwestern New Mexico and southern Arizona. Between eleven and twelve inches long, the male has the upper parts a rich metallic bronze-green, varying to golden or coppery bronze, while the middle tail-feathers are deep metallic bronze, varying to rich copper-color, and black-tipped; the lower parts are a pure scarlet-vermilion with a white band across the breast, and the throat and upper breast black and metallic greenish. The female is a light grayish brown above. Within the United States this species frequents the dense coniferous forests, especially of the Huachuca Mountains of Arizona, where it doubtless breeds, as immature young have been taken there. Of its habits as observed there, Dr. Fisher says: "Higher up the mountain we heard its peculiar note which was uttered at regular intervals and closely resembled that of a hen Turkey. . . . It sat straight upright on the lower limbs of a pine with the tail hanging perpendicular to the body, and while uttering its note the head was thrown backward and the bill extended nearly upward." The nesting habits of this species appear to be unknown, but when they have been observed in other species of the genus, the nest is always placed in a very much decayed stump and at no great distance from the ground; the eggs accord in color with those of the other members of the group.

African Trogons. — Only four species of Trogon are found in Africa, and of these three belong to the genus *Apaloderma*, which also falls within that section of the family in which the central pair of tail-feathers are the same in both sexes, being purplish or greenish without terminal bars to the central pair. There is a naked space behind the eye, and the upper mandible is provided with serrations on the edge. The best-known and most widely spread species is the Narina Trogon (*A. narina*), which ranges from Northeast Africa to the Cape of Good Hope and on the southwest as far north as Angola. In this handsome species the entire upper surface as well as the throat and chest are a shining green, while

the lower parts are a brilliant crimson; the length is eleven and one half inches. It is a bird of shy, creeping habits, keeping well concealed amongst the bushes and dense trees which it frequents, sitting motionless on a branch until actually discovered by the hunter. It is said to feed on fruits and insects and to utter a "loud moaning note, or, perhaps, more correctly speaking, a hoot." Le Vaillant states that they nest in holes of trees, and lay four, nearly round, white eggs, but this is said to lack confirmation. The other species are Ussher's Trogon (*A. constantia*) of the west coast and the Red-vented Trogon (*A. rufiventre*) of Lake Tanganyika, central Africa. The Banded Trogon was formerly included in this genus, but Dr. Richmond has separated it under the name of *Heterotrogon* (*H. vittatum*), on the ground of the extremely small, slender, and much-compressed bill, both mandibles of which are without serrations of any kind behind the subterminal notch. It is an extremely rare bird, inhabiting the mountains of East Africa, and little is known of its habits.

FIG. 170.—African Narina Trogon, *Apaloderma narina*.

The **Oriental Trogons** are referred to two genera, in the first of which (*Pyrotrogon*), embracing fourteen species, the sides of the face are naked, the upper mandible not toothed behind the subterminal notch, and the tail rather long with broad, squarely truncated feathers, the central pair being chestnut in color, with a terminal band of black in both sexes; they are about twelve inches in length. According to Oates, Blanford, and others, the habits of all the species are quite similar, they being forest-loving birds and, after the well-known manner of Trogons, affect concealment by remaining motionless on large branches of trees. They subsist on insects, chiefly beetles, moths, or cicadæ, which they mainly fly out after, although they sometimes seek them on the ground. The nests are placed in hollows in rotten stumps or branches and are not lined; the eggs are creamy white and glossy. One of the handsomest species is the Red-headed Trogon (*P. erythrocephalus*) of the eastern Himalayas, the Burmese provinces, and the mountains of the Malay Peninsula. The head and neck all around, as well as the upper breast and the lower parts behind a poorly defined gorget, are crimson, while the back, wing-coverts, and rump are rufous-brown and the wings black, the former finely vermiculated with narrow, undulating white lines. The female is orange-brown or rufous rather than crimson, and is altogether much less showy than the male. Another fine small species is the Red-rumped Trogon (*P. duvauceli*), also of India, but extending to Sumatra and

Borneo. The male has the whole head and neck jet-black and the rump, upper tail-coverts, and entire under parts rich crimson.

The final genus (*Hapalarpactes*) includes only two species, one of which (*H. reinwardti*) is confined to Java and the other (*H. mackloti*) to Sumatra. They are known by having the cheeks, a spot behind the eye, and the gape naked, while the three central pairs of tail-feathers are bluish green without terminal black bands as in the last, and the throat is yellow. Further, they are the only Asiatic species with metallic backs.

PICARIAN BIRDS

(Suborder *Pici*)

Although there are some gaps between the individual groups here included within this suborder, they constitute as a whole a very well marked assemblage, which is distinguished at once from all other groups by the possession of a "yoke-toed" (zygodactylous) foot, in which the flexor muscle, which usually supplies the second, third, and fourth toes, is single and goes only to the third toe, while the other (*flexor hallucis*), which normally moves only the first toe or hallux, is the one split into three branches and serves the first, second, and fourth toes. The ambiens muscle, of which mention has frequently been made, is absent in the members of this group, while the oil-gland, which is also of much taxonomic importance, is either naked or tufted, thus permitting the group to be divided into two minor groups. There are, of course, other characters, but it is perhaps unnecessary to enumerate them at present.

The *Pici*, according to Gadow, may be divided into four families, — the *Galbulidæ*, or Jacamars and Puff-birds, *Capitonidæ*, or Barbets and Honey-guides, *Rhamphastidæ*, or Toucans, and the *Picidæ*, or Woodpeckers and Wrynecks.

THE JACAMARS AND PUFF-BIRDS

(Family *Galbulidæ*)

This family, which is by some systematists denominated a suborder, may be divided into two well-marked subfamilies, — the *Galbulinæ*, or Jacamars, and the *Bucconinæ*, or Puff-birds. They agree among themselves in having the oil-gland nude, the cæca present and functional, as well as normal, that is to say two, carotids; all are natives of the tropical parts of the New World.

The Jacamars (Subfamily *Galbulinæ*). — This is a small but well-defined group of birds, which differ from their nearest allies the Puff-birds in having a long, pointed bill with angular gonys, a small but clearly defined aftershaft to the contour feathers, and a peculiar branching to the pectoral feather tract. They have in general weak feet with the tarsi smooth behind, rather short,

rounded wings with ten primaries, the first being much reduced, and normally a tail of twelve feathers; but in certain of the forms the outer one on each side is either abnormally small or wholly absent. In one genus (*Jacamaralcyon*) the hind toe is absent. In coloration of the plumage Jacamars are mainly a coppery or golden green above, though a few forms are blackish or brownish. They are described as being rather dull, stupid birds, frequenting especially the borders of the forests, where they sit for hours on the limbs of the high trees, only turning the head from side to side, or now and again launching out after the manner of a Flycatcher, to secure some passing insect, yet in speaking of the Red-tailed Jacamar (*Galbula ruficauda*) as observed in Trinidad, Mr. Frank M. Chapman says: "These birds are by no means so stupid as they have been said to be. They are the most expert flycatchers I have ever seen, and this in spite of the fact that the shape of the bill would seem better to fit them for almost any other mode of existence. Sitting all drawn in on a dead limb, generally near the ground, they may be compared to a set spring. Their watchfulness permits no insect to pass in safety. They maintain a constant lookout, turning the head quickly from side to side, above, or even halfway round. The dart into the air is made with wonderful celerity. Sometimes it is straight up, again at various angles, and they go as far as thirty or thirty-five feet from their perch. As a rule they return to the same perch after each sally, and may occupy this for many minutes." While resting this species utters a "loud, clear, piping whistle, not unlike the call of a lost duckling," which may be interrupted as the bird darts out after an insect, but is renewed as soon as it again alights. Of the only species — the Black-cheeked Jacamar (*G. melanogenia*) — observed along the Escondido River, Nicaragua, Dr. Richmond says: "It has a piercing cry, resembling *kee'u*, with the first syllable very shrill and strongly accented. The stomach of one specimen shot contained insects. The bird jerks its tail after the fashion of a Kingfisher."

Fig. 171. — Jacamar, *Jacamerops aurea*.

Very little appears to be definitely known regarding the nesting habits of these birds, and some ten years ago Mr. Sclater, who has monographed the family, acknowledged that he had never seen a Jacamar's egg. By some they are said to dig a burrow in a bank like a Motmot, and lay two or three pure white eggs, while others assert that they at least occasionally deposit the eggs in a tree cavity.

The twenty or more species of Jacamars are disposed among six genera, all being confined to South America east of the Andes and Central America as far

as southern Mexico. Of these the Paradise Jacamar (*Urogalba paradisea*) of Guiana may be known at once by its purplish black color and greatly elongated central tail-feathers, these being more than half the whole length of the bird. The typical and largest genus is *Galbula* with eleven forms, which may be recognized by the coppery or golden green plumage and only slightly lengthened tail-feathers. Passing over the next three genera in which the tail is short and squared, we come to *Jacamerops*, which includes only the Great or Broad-billed Jacamar (*J. aurea*) of wide range over Central America, Amazonia, Peru, etc. It has an incurved bill, nostrils with an internal membrane instead of being naked as in the others, and a tail of twelve feathers, the three outer pairs of which are much graduated. In color it is shining metallic golden or coppery green above, becoming blackish on wings and tail, chestnut on the abdomen, and white on the throat; the length is about ten and a half inches.

The Puff-birds (Subfamily *Bucconinæ*).—The members of this well-marked subfamily differ from those last mentioned, as already suggested, by the shorter and stronger bill, which is more or less incurved or hooked at the tip, by the stronger tarsi scutellated behind, as well as by the absence of an aftershaft to the contour feathers. They are for the most part purely arboreal and largely forest-haunting birds, and as Swainson long ago said, "there is something very grotesque in the appearance of all Puff-birds, and their habits, in a state of nature, are no less singular. They frequent also open cultivated spots near habitations, always perching on the withered branches of a tree, where they will sit nearly motionless for hours, unless, indeed, they descry some luckless insect passing near them, at which they immediately dart, returning again to the identical twig they have just left, which they will sometimes frequent for months at a time. At such times the disproportionate size of the head is rendered more conspicuous by the bird raising his feathers so as to appear not unlike a puff-ball, hence the general name they have received from the English residents of Brazil." Their lack of fear or stupidity is well illustrated in the following account of the habits of the Two-banded Puff-bird (*Bucco bicinctus*) as observed by Mr. A. H. Clark on Margarita Island, Venezuela: "We have no bird which, for pure foolishness and general lack of spirit, can be compared with the Two-banded Puff-bird. Resembling somewhat, with its large beak and dark breast-bands, a clumsy Kingfisher, it can be approached very closely without taking alarm; and when it does fly, it merely goes to the nearest available tree or bush and awaits the second approach of the intruder. Even when shot at, it flies only a few yards, and then alights, inviting its pursuer to try again. Sometimes it does not fly at all, but remains stupidly staring at the cause of the disturbance, until you either take pity on its idiocy or kill it. I have shot two of three, perched near together, the second not being moved in the slightest degree by the death of the first. This bird is provided with a number of blunt spurs on its wrists, with which it might possibly give one an unpleasant surprise; but I never saw an individual attempt to use them, as when wounded, no matter how slightly, they always seem quite resigned, and do not struggle as would a Robin or Blue Jay under similar circumstances."

As is the case with the Jacamars, very little appears to be known regarding the nesting habits of the Puff-birds; in fact, the only species of which the nests appear to have been found are the so-called Swallow-wings (*Chelidoptera*), the two forms of which range from Venezuela to southeastern Brazil. The nests were located in holes dug to a depth of two feet in perpendicular sand-banks along streams, the two shining white eggs being placed on a slight lining of feathers at the end. The habits of the other species are presumably similar, although Dr. Richmond mentions having shot a female of a Panama Soft-wing (*Malacoptila panamensis*) in eastern Nicaragua, which was about ready to deposit eggs, and from the fact that it was shot from a twig directly in front of a hole in a bamboo, he inferred that this was probably where the nest was located.

The Puff-birds are included in seven genera and about forty-five species, and have their center of distribution in Amazonia, whence they range in decreasing numbers to Guatemala on the north and Paraguay on the south. The typical and largest genus is *Bucco* with twenty one species, known by the nearly straight bill which is widened at the base and hooked at the tip. In coloration the species are black, brown, or rufous above and white below, where they are often crossed by one or more dark bands; the usual length is between six and eight inches. Closely allied but differing in the weaker and more-incurved bill and larger and more-rounded tail are the Soft-wings (*Malacoptila*), of which there are eight species extending from Guatemala to Brazil. They are brown or rufous above and fulvous, usually striated with darker below; several have a spot or band of white on the breast. The Banded Soft-wing (*M. torquata*) Burmeister states to be the commonest species in certain parts of Brazil. "It comes into the village gardens, and sits by the roadside without taking the least notice of what is going on around it. The impression made on a stranger by one of these curious birds is rather startling, as seen at a distance through the thick forest with its white breast shining and when one approaches it seems to stare at the traveler with its great open eyes as if not to know what to do. Stupidity and simplicity are so evidently impressed upon it that the Brazilians naturally call it *Joao doido* — Silly John."

The smallest and most delicate members of the subfamily are the Nunlets (*Nonnula*), none of the five species exceeding five and two thirds inches in length; in color they are brown above and fulvous or ferruginous below. One of the best known of the five species is the Red-capped Nunlet (*N. rufica pilla*) of central Brazil and upper Amazonia, which is known by its chestnut cap. It is a rather solitary bird, found usually on low bushes, or branches near the ground, at the edge of the forests. Nearly twice the length of these are the Nunbirds (*Monasa*), so called from the somber black or slaty plumage, which, however, is somewhat relieved by a bright red or yellow bill, and in some there is white at the bend of the wing and about the bill. The final genus contains the two species of Swallow-wings (*Chelidoptera*), the most aberrant members of the group. They are small birds about six inches in length, bronzy black above, with the exception of a white rump, and cinereous or chestnut below.

THE BARBETS AND HONEY-GUIDES

(Family *Capitonidæ*)

There are differences of opinion as to the propriety of associating these birds in the same family, and the Honey-guides have not infrequently been placed near the Cuckoos; but in the structure of the "yoke-toed" feet they all appear to agree closely with the Woodpeckers, while in other particulars, especially in the arrangement of the feather tracts, they approach the Toucans. They also agree with the Woodpeckers and Toucans in possessing a tufted oil-gland and the left carotid only, while they differ in the structure of the palate, this being ægithognathous with desmognathous tendency, as Gadow states. They are rather sharply divided into two subfamilies,—the *Capitoninæ*, which embraces the Barbets, and the *Indicatorinæ*, or Honey-guides.

The Barbets (Subfamily *Capitoninæ*).—The Barbets take their name from the French, signifying a sort of beard, from the presence of numerous strong bristles about the base of the bill. They are stockily built birds of small size, many of them being under six inches in length, with relatively large heads and large stout bills, and altogether they present a rather ungraceful appearance, although in the matter of coloration many of them are exceedingly gorgeous, but as Dr. Stejneger says, the "juxtaposition of the colors is such as to produce a tasteless effect. Sky-blue, light green, and yellow are sometimes found combined with red and other colors in such a manner as to annoy an eye accustomed to harmony in colors." The Barbets are mainly birds of the forests or the more timbered portions of cultivated areas, where they spend most of their time near the tops of the trees, occasionally coming down among the surrounding bushes. Some of them climb about the trunks not unlike Woodpeckers, and even search for insects in the crevices, but the majority are more frequently observed hopping from branch to branch, as they search for their food. They are not very active birds, but are said to sit motionless for hours, uttering their various calls at intervals, the latter accompanied in some species by a movement of the head from side to side, in others by a jerk of the tail over the back. Their food is somewhat varied, consisting in some cases almost exclusively of fruits and seeds with few insects, while in others it appears to be almost entirely of insects. So far as is known the Barbets nest in holes in trees, or rarely in banks, excavating for themselves a neat hole, usually on the under side of a branch and in soft or decaying wood. The nest hole often extends for several feet into the branch, and not infrequently is provided with two openings. The eggs, from three to five in number, are oval in shape and white and somewhat shining, very much like those of Woodpeckers, although usually not quite so glossy. The flight of the Barbets is ordinarily undulating but strong and rapid.

The Barbets enjoy a wide geographical distribution, being found in the tropical forest regions of both the Old and New Worlds, except that they are absent from the West Indies and the Australian region. They are most numer-

ous in the Ethiopian region, which boasts the presence of eleven of the twenty-one genera and over eighty of the hundred and forty species; the Oriental regions lay claim to eight genera, while only two genera and eighteen species find a home in the American tropics. The manner in which this distribution was brought about is unknown, as no fossil forms have been discovered, but it was doubtless similar to that suggested for the Trogons.

One of the most interesting of the African species is the Little Tinker Barbet (*Barbatula pusilla*), which belongs to that section of the group in which the bill is without a tooth. Only four and a half inches in length, it has the upper plumage black, variegated longitudinally with sulphur-yellow, the top of the head being bright red and the front of the head with a narrow black band, while the wings and tail are earth-brown, the coverts more or less bordered with golden yellow; the under surface is greenish yellow, and the throat and upper and under tail-coverts are lemon- or sulphur-yellow. "The note of this curious little bird," says Mr. Ayres, "so much resembles the tapping of a hammer on an anvil, that having that peculiar metallic ring, it is called in Natal the Tinker Bird. It is silent during the winter months, commencing its monotonous cry in the spring, and continuing it throughout the summer. They are numerous, but not easily seen, in consequence of their small size, and their habit of sitting quietly on the tops of thick, bushy trees. When in search of food, they climb and creep about the thick foliage of trees. They inhabit the coast bush, being seldom found ten miles inland."

FIG. 172. — Toucan-Barbet. *Semnornis rhamphastinus.*

The species selected for illustration is the Toucan-Barbet (*Semnornis rhamphastinus*) of Ecuador.

The Honey-guides (Subfamily *Indicatorinæ*). — The curious little birds, known as Honey-guides, take their common name from their well-known habit of directing attention to the nests of bees. They are small brownish or blackish birds, the plumage often enlivened with yellow and white, ranging in length from four and a half to a little over seven inches. As above stated, they were long supposed to be related to the Cuckoos, which they resemble in the form of the feet as well as in nesting habits, but they are now known to be much more closely allied to the Barbets and Woodpeckers. They have stout, rather Finch-like bills, wings with nine primaries, and tails of twelve, or in one genus of ten, feathers, the outer pair being small as in Woodpeckers. They are comprised in three genera and eighteen species, all, with the exception of

two, being natives of various parts of Africa. Of these two exceptions the Yellow-backed Honey-guide (*Indicator xanthonotus*) is found in the Himalayas, and the Malayan Honey-guide (*I. archipelagicus*) in the Malay Peninsula and Borneo.

The habits of the Honey-guides are not well known, but they are believed to resemble in these features certain Cuckoos in that they lay their eggs in the nests of other birds. Sharpe, writing of the African species, says: "In place of selecting totally different birds, the Honey-guides appear to choose for victims their own nearest kindred, such as Barbets and Woodpeckers; the Little Honey-guide (*I. minor*) depositing its white eggs in the nests of the Red-vented Woodpecker, the Little Tinker Barbet or the Pied Barbet, while the large White-backed Honey-guide selects the Banded Barbet as its victim." Their food consists of bees, grubs, and doubtless other insects. Their method of honey-guiding is set forth in the following extracts from well-known writers on African birds. Of the Little Honey-guide (*I. minor*) Mr. E. L. Layard writes as follows, his authority being Sir John Kirk: "The Honey-guide is found in forests, and often far from water during the dry season. On observing a man it comes fluttering from branch to branch in the neighborhood of trees, calling attention. If this be responded to as the natives do by whistling and starting to their feet, the bird will go in a certain direction and remain at a little distance, hopping from one tree to another. On being followed it goes further; and so it will guide the way to a nest of bees. When this is reached it flies about but no longer guides; and then some knowledge is needed to discover the nest even when pointed out to within a few trees. I have known this bird, if the man after taking up the direction for a little then turns away, come back and offer to point out another nest in a different part. But if it does not know of two nests it will remain behind. . . . The object this bird has in view is clearly the young bees. It will guide to nests having no honey, and seems equally delighted if the comb containing the grubs be torn out, when it is seen pecking at it." Unfortunately it does not discriminate between domesticated and wild bees, and will guide as readily to hives about a farmhouse as to one in the forest.

Another African traveler, Mr. W. T. Barnaby, has published a recent account (*Ibis*, Oct., 1900). He had heard of this peculiarity of the Honey-guide and requested of his native "boys" that they notify him the first time they heard one calling. He writes: "On another occasion, just after I had shot a hyæna and while we were engaged in skinning it, my boys told me they could hear the Honey-guide calling to them. I went with them into the bush, and we saw a little brown bird flying from tree to tree, and heard it uttering a kind of twittering note. After following the bird a distance of some three or four hundred yards through the brush my boys discovered the bees' nest in the trunk of a tree, not far from the ground, and immediately proceeded to cut out the honey."

The dwarf Honey-guides (*Prodotiscus*), of which three species are now known, are distinguished by having only ten feathers in the tail, and a much thinner bill than the species in the larger genus. The Brown Honey-guide (*P. regulus*) of Natal is only five inches in length and is marked at once by its nearly uniform brown plumage; little is known regarding its habits.

THE TOUCANS

(Family *Rhamphastidæ*)

It must have become manifest to the reader that the bills of birds are variously modified to adapt them to their several modes of life, some for cutting and tearing flesh, others for drilling in wood, probing in mud, etc.; but of all these modifications the bills of the Toucans are, with the possible exception of those of the Hornbills, the most remarkable, although, it must be confessed, the utility of these enormously developed bills in Toucans is not very clear. As Stejneger says: "The first thing which strikes the observer, when looking at one of the large Toucans, is the enormous size of the bill. It is not only as long as the bird itself, but it does not lack much in equaling the body in bulk; and the observer will most likely make the remark that such an enormous bill must be very heavy. The fact is, however, that the bill is extremely light in comparison with its size, being very thin and filled with a light, cellular bony tissue." The outer wall of the bill is said by Owen to be in most parts only one fiftieth to one thirtieth of an inch in thickness. The tongue is also curiously modified, consisting of a narrow, flat plate with the margins notched, the notches becoming deeper toward the apex; it is from four to six inches in length.

The Toucans are confined to the New World and are distributed more or less abundantly over the wooded districts from southern Mexico to northern Argentina. They do not occur even in the Antilles, on the western slope of South America south of the Gulf of Guyaquil, or in any part of the Patagonian region. The species are most numerous in the great forest region of Amazonia, and they are disposed by Sharpe in his Hand-list of Birds among five genera and sixty-three species.

In plumage many of them are very brilliant, their black or green bodies being ornamented with red, orange, white, and blue. The bills and other exposed parts of the body are also usually highly colored, and altogether the Toucans are a remarkable and interesting group of birds.

The Toucans are described as being rather noisy, flying easily and gracefully through the forests, in their habits somewhat resembling Crows and Magpies, and like these birds delighting to worry Owls and other birds of prey. They gather around and make a great outcry, but rarely venture an open attack. Their notes are said to be very unmelodious, the call of one species resembling the word *tucano*, whence the name Toucan. Others make a peculiar rasping noise.

In a wild state their food consists largely of fruit, but in captivity they will eat most anything, and as they are readily tamed are often seen as pets. It has been asserted that in eating the Toucans toss their food up in the air, catching it as it falls, but it appears that they simply hold up the bill and allow the food to fall down the throat.

One marked peculiarity of the Toucans is their habit of jerking the tail and turning it upon the back. They are said to sleep with the tail thus thrown up

on the back and the bill tucked under the short feathers of the wings and shoulders. It appears that the tail bones are articulated by a regular ball-and-socket joint, which permits great freedom of movement, and the tail is elevated with such a jerk as to suggest the notion that it is "operated as by a spring."

The nesting habits of the Toucans are not very well known, but so far as present information goes the eggs are always deposited in hollow trees. They are regularly oval in shape, pure white, of a fine grain and slightly shining.

The Toucans range in length from twelve to twenty-four inches, though the average length is perhaps between fourteen and eighteen inches. The genus *Rhamphastos*, which comprises some fourteen species, includes the largest forms, one of the most widely distributed and best-known being the Toco (*R. toco*), which ranges from southern Mexico to northern Argentina. It is black above and below, with the rump, throat, and fore neck white slightly tinged with yellow on the neck, which is narrowly bordered with red. The crissum is crimson and the bill orange with a large black spot at the base of the upper mandible; the total length of this species is twenty-two inches, of which the tail comprises six inches and the bill nearly six and a half inches. The Toco is said by Hudson to commit great havoc among the orange groves in northern Argentina. Closely allied to the last but slightly smaller and having the throat and fore neck clear yellow, is the Keeled Toucan (*R. carinatus*) of Central America, while the Ariel (*R. ariel*) of eastern Brazil belongs to a group in which the upper tail-coverts are scarlet and the bill black with a lighter basal band. The latter species is exceedingly abundant in many places along the Amazon, particularly in autumn, where they congregate in vast flocks, and on alighting in a tree one is posted as a sentinel, while the others disperse over the branches in search of fruit.

Perhaps most closely related to members of the last genus are the five or six species of the genus *Andigena*, which are known as Hill Toucans, since all but one of the forms inhabit the high forests of the Andes, the exception being *Andigena bailloni* of southeastern Brazil, which is also anomalous in coloration, its general plumage being yellow, whereas in the others the general coloration below is bluish gray. The most remarkable member of the genus is the Laminated Hill Toucan (*A. laminirostris*) of Ecuador and Peru, which has a peculiar raised buff-colored plate on either side of the upper mandible, just in front of the blood-red basal band. About seventeen inches in length, this species is a clear olive-brown above with the head and nape black, the rump lemon-yellow, and blue below with a flank spot of yellow, while the bill is black with the above-mentioned scarlet band at the base. Very little is known of its habits.

The most brilliant and diversified members of the family are the so-called Aracaris, which to the number of eighteen species comprise the genus *Pteroglossus*. They have a plumage of green, scarlet, and yellow, often arranged in patches of marked contrast, while the great bill is equally strongly marked. Perhaps the finest species — indeed by some it is regarded as one of the handsomest members of the entire Neotropical contingent — is the Curl-crested Aracari (*P. beauharnaisi*) of upper Amazonia, which has the upper parts dark green with the upper back and rump edged with crimson, while the feathers

Fig. 173. — Sclater's Aracari, *Pteroglossus didymus.*

of the head are scaly, curled, and shining black, whence of course its name. Beneath it is yellow with the throat-feathers tipped with round black spots, and a broad band of crimson or scarlet crosses the belly and flanks, which color also tinges the breast, while the upper mandible is blackish with a broad culminal band of orange, and the lower mandible white; the total length of the bird is seventeen inches, of which the bill comprises four, and the tail six and a half inches. None of the other species of the genus has the beautiful curled crest feathers, though as regards the remainder of the plumage they are hardly less brilliant, such, for instance, as Maximilian's Aracari (*P. wiedi*) of lower Amazonia and southeastern Brazil, which is dark green above, the head and nape black, and the rump scarlet, while beneath it is pale yellow with the throat and neck black, and the ventral region scarlet; the upper mandible is white with a narrow culminal stripe and the lower mandible black. In Sclater's Aracari (*P. didymus*), the species selected for illustration, the lower parts are not banded, but otherwise it is quite similar.

Passing over the genus *Selenidera*, the seven species of which are in general similar to the *Pteroglossi* though having the sexes markedly dissimilar, we come to the final genus *Aulacorhamphus*, of which fifteen forms are recognized. They are distinguished at once by their uniform style of plumage, this being bright green, which harmonizes perfectly with the forest leaves among which they spend their lives. The species are separated mainly on the color of the throat, this being white, blue, or black, and on the color of the bill.

THE WOODPECKERS AND WRYNECKS

(Family *Picidæ*)

The members of this family form a very compact and well-characterized aggregation and are a group about which there is little popular misunderstanding, since all agree quite closely with the abstract idea of what a "Woodpecker" is like. They have sometimes been placed among the Sparrow-like birds (*Passeriformes*) and in some respects, as in the structure of the palate, are somewhat intermediate between these and the typical members of the great Picarian group. All things considered, it seems beyond question best that they should be placed in the latter group, since in habits as well as in structure they approach its members most closely. They have, of course, the "yoke-toed" foot mentioned as peculiar to the suborder *Pici*, and belong to that division in which the oil-gland is tufted, and the cæca none or quite rudimentary. The first of the two subfamilies into which it is possible to divide the family embraces the true Woodpeckers.

True Woodpeckers (Subfamily *Picinæ*).—It is perhaps hardly necessary to state that the Woodpeckers are in general small or medium-sized, mainly woodland birds, being rarely more than twenty or less than five inches in length, with usually powerful, more or less elongated, chisel-shaped bills well

adapted for cutting wood, and strong legs, feet, and claws, by means of which they readily cling to and run about the trunks and limbs of trees. In the matter of climbing certain of them are greatly assisted by their tails, the twelve feathers (apparently only ten, since the outer pair is aborted or much abbreviated) of which have the shafts stiff and spiny, and serve to keep the body pressed close to the trunk; in other cases the feathers of the tail are soft and more like those of ordinary birds, in which case the birds do not climb about trees to any great extent. One of the most marked peculiarities of Woodpeckers is shown in the structure of the tongue, this being in some respects more modified than in any other birds. It is very extensile and may be protruded to an astonishing length in some species. To accommodate this long tongue the supporting bones slide backward into a sheath, which is carried around the back of the skull, meeting on its summit, and continuing on toward the forehead. Mr. F. A. Lucas, who has made a special study of the tongues of Woodpeckers, says that in other long-tongued birds, as the Hummingbirds, for example, the bones of the tongue may pass around the base of the skull and even reach to the base of the bill, but in the longest-tongued Woodpeckers these bones, after reaching this point, turn to the right, pass through the right nasal opening, dipping under the nostril, and then continue quite to the tip of the bill. This is of course the extreme possible length the tongue can attain without a further elongation of the bill. The tongue at its tip is more or less worm-like and provided with barbs or minute points, although occasionally it is smooth. It is often provided, also, with a sticky secretion, which is of great assistance in picking up insects, ants, etc., and is usually a character of the ground-haunting forms. In the latter group the bill is not as strong as in the wood-cutting species, since most of their food is obtained on the ground. As further characters it may be mentioned that the tails are usually more or less wedge-shaped, and the rather pointed wings are of moderate size, with ten primaries and from ten to thirteen secondaries. The prevailing colors of the plumage are black, white, green, red, and yellow, variously disposed, but frequently with spots and bars. Many species are provided with splendid crests, often of brilliant scarlet, a color not infrequently present on the back and lower parts. Down feathers are not present in either adults or young.

Habits. — Woodpeckers are rather solitary birds, being, perhaps, most frequently observed as individuals, although before the young have left the fostering care of the parents, family parties are common, and frequently several of the smaller forms may be found in attendance on the miscellaneous assemblages of small birds often met with in the woods. While among them are some of the tamest of birds, they are ordinarily shy, even in localities where they are not persecuted, and when an intruder appears, they are usually quick to place the trunk or a large limb between themselves and possible danger, and may then be seen taking sly peeps over the limb, or edging around just fast enough to keep out of sight. Many of the larger species are so shy that they can only be approached with the greatest caution, flying to a great distance when once thoroughly alarmed. When seeking their food the arboreal species usually begin

at the base of a trunk and ascend slowly, often in a spiral manner, prying into crevices, knocking off pieces of bark, or digging deeply into decaying limbs, until they reach the higher branches, when they repeat the process on the next tree that comes handy or otherwise attracts their attention. The ground-feeding species subsist largely on ants, and when they have discovered a fresh nest, usually clean it up pretty thoroughly. The food of the arboreal species consists very largely of insects, especially the larvæ of wood-boring beetles, but most of the species take a greater or less amount of vegetable matter in the form of berries, seeds, acorns, or the tender inner bark of trees, while a few forms known as Sap-suckers subsist, to some extent at least, on the sap of trees, causing thereby some damage, since they often pierce rows of holes about the trunks or larger limbs. A few species are known to store up food for the proverbial rainy day. The Red-head and the California Woodpecker store acorns, beechnuts, and sometimes grasshoppers, in the crevices of fence rails, trunks and limbs of trees, etc., in the latter case often boring regular rows of holes for the purpose, each containing an acorn.

Notes. — The notes of Woodpeckers are rather loud and harsh, though not altogether unmelodious. Especially in spring, but at other seasons as well, the male, and perhaps the female also, executes the so-called "drumming," which consists of rapid blows delivered on a dead limb or piece of loose bark, the sound being audible often for the distance of a mile.

In the passage between near-by trees the flight of most Woodpeckers resembles the swaying of a pendulum, being downward and then upward just before alighting, but when it is for some distance the flight is undulating and is in general so characteristic that it is possible to distinguish species at some distance.

Nests and Eggs. — The nesting habits of Woodpeckers are very uniform, since all deposit their eggs in cavities, either in trees or in banks. A natural cavity is apparently rarely selected, but one is excavated by the birds themselves. Usually the site chosen is an upright dead or decaying trunk or large limb, though some species select a perfectly solid trunk. A circular hole is first made which extends in for several inches, then turns abruptly downward for a varying distance, sometimes several feet, but usually not over eighteen inches. Apparently both birds work at its construction in turn, and they are usually careful to remove the chips to a considerable distance, since their accumulation at the base of a tree would serve to call attention to a nest that might be otherwise unobserved. The cavity is slightly enlarged at the base and is never lined, the eggs being deposited on a few chips at the bottom. The eggs, which vary somewhat in number with the different species, are always pure white and very glossy.

The Woodpeckers constitute a large, almost cosmopolitan, group, of about seventy genera and over four hundred species, "ranging over almost all of the temperate and tropical regions, but absent in Madagascar, Australia, and Polynesia." The New World is especially rich in forms, while the African and Indian regions are also centers of distribution. The Woodpeckers are divided into two well-marked groups, often denominated as subfamilies, in the first of which the tail is spiny, all the shafts being stiffened and employed in

climbing; in the second group the tail is soft and rounded and not at all spiny. To the former belong the typical Woodpeckers with mainly arboreal habits, while the latter group includes only the diminutive Piculets mainly of South America.

African Ground Woodpecker. — According to Hargitt, nearly half the genera and considerably more than half the species are distinguished by the fact that the feathers of the neck are ordinary; that is, the neck is not perceptibly compressed or narrowed in comparison with the head. We may appropriately begin the consideration of these with the remarkable Ground Woodpecker (*Geocolaptes olivaceus*) of South Africa, the sole representative of its genus. It is a small bird, not over ten inches long, the general color being olive-brown, mottled with dirty yellow, the male having the rump, breast, and abdomen crimson, as well as a crimson mustache, these parts being brown in the female; the tail is dark brown, barred with yellow, the under side being glossed with golden yellow. "This singular bird," says Layard, "presents a remarkable instance of the adaptation of creatures to the locality wherein their lot is cast. Though belonging to the Woodpecker family, it never pecks wood, but bores its way into banks of rivers, sides of hills, or the walls of mud buildings, in search of its prey, and for a home for its young. It also seeks for food on the ground, in the same manner as the Golden-winged Woodpecker of North America; its flight likewise struck me as very similar. It excavates a hole, sometimes several feet in depth, in which to deposit its eggs, which are pure white, and from three to five in number. Families seem to keep in company until the arrival of the breeding season separates them. They feed together and roost together in some deserted hole, while their loud, harsh cries, as they call to each other, may be heard for a considerable distance." These birds rarely if ever perch in trees, but are often noted climbing about the face of perpendicular rocks and there searching for their food as other species search a tree-trunk.

Flickers. — The next in order are the Flickers (*Colaptes*), a large group of nearly twenty closely related, perhaps some of them interbreeding, forms, ranging throughout North and Central America, and South America as far as Chile and Patagonia, and occurring also in Cuba. They are handsome birds, mostly between eleven and fourteen inches in length, the general color above being brownish, barred with black, except on the rump and upper tail-coverts, which are more or less white, and pale vinaceous yellowish or whitish below, marked with roundish or heart-shaped spots of black, and a large black crescent on the breast; the outer surface of the quills and the upper surface of the tail-feathers is black, the shafts of these feathers being either bright yellow or red, these colors showing also on the under surfaces of the wings and tail. The best-known species is the Common Flicker (*C. auratus*),[1] also called the Golden-winged Woodpecker, Yellow-hammer, High-hole, Wake-up, etc., the latter from certain of its notes which resemble the words *wake-up, wake-up*. It belongs to that section of the genus in which the shafts, etc., are golden yellow, while the back

[1] Mr. Bangs has recently separated the form found in the Northern states under the name of *C. auratus luteus*, on the ground of its large size and somewhat paler colors, but the differences are not great.

part of the head is adorned with a patch of red, and the rump is immaculate white; the length is about twelve inches. It is distributed over eastern North America, north to Hudson's Bay and west to the Great Plains. It is among the best-known of our birds in New England, returning from its winter home in March or April and soon making the woodland ring with its far-reaching but pleasing call notes; it is, however, not migratory south of the parallel of 40°. It is, says Bendire, "one of the most sociable of our Woodpeckers, and is apparently always on good terms with its neighbors. It is especially demonstrative during the nesting season, and is an ardent wooer. It is an exceedingly interesting and amusing sight to see a couple of males paying their addresses to a coy and coquettish female; the apparent shyness of the suitors as they sidle up to her and as quickly retreat again, the sly glances given as one peeps from behind a limb watching the other, seem very human." For a nesting site it prefers open woodland or orchards, and is not hard to please; any old stump or partly decayed limb of a tree will serve the purpose. If suitable nesting places are readily available, a new cavity is excavated each year, but if not, an old hole may be used for many seasons. The entrance is often two and a half inches in diameter and the depth of the hole from ten inches to two feet; it is usually considerably enlarged at the bottom. In localities where suitable trees are not to be found, they may dig a hole in a bank like a Kingfisher, in gate-posts, or in the side of a building, and Major Bendire records one instance where a pair excavated a hole in a haystack. The eggs usually number six or seven, but larger sets are not uncommon, and if the eggs are removed, the female will usually deposit a second clutch. There is a remarkable case on record where a Flicker was induced, by taking the egg each day, to lay seventy-one eggs in seventy-five days. The young birds are very voracious and often clamor loudly for their food, which appears to be partially digested by the parents before it is given them, the process of feeding them being a "pumping" action not unlike that described in the Ruby-throated Hummingbird.

As the food of the Flickers consists largely of ants and ground-haunting insects, they are frequently seen in open country on the ground. They also feed, to some extent, on berries and fruits, such as cherries, mulberries, raspberries, wild grapes, dogwood, etc., and while they may do some damage in this respect, the good accomplished in destroying noxious insects is much more than counterbalanced.

Closely allied to this species is the Cuban Flicker (*C. chrysocaulosus*), which has the white rump thickly spotted with black, and the Gilded Flicker (*C. chrysoides*) of Lower California, southern Arizona, and Sonora, which is distinguished by the absence of red on the occiput, gray instead of vinaceous throat, and red instead of black mustaches in the male. Throughout all the western United States occurs the Red-shafted Flicker (*C. cafer collaris*), a representative of the group in which the shafts of quill- and tail-feathers are red. Along the line of contact between this and the eastern Flicker it is common to find intermediate forms, and along the northwest coast from northern California to Sitka there is a darker form known as the Northwest Flicker (*C. c. saturatior*), while

another much smaller race (*C. cafer*) is found on the table-lands of Mexico. Another very closely related form of the red-shafted type is the Guadalupe Flicker (*C. rufipileus*) of Guadalupe Island, Lower California. The Pampas Flicker (*C. agricola*), of the pampas region from southern Brazil to Argentina and Patagonia, is a large bird, thirteen and a half inches long, with a rather weaker bill, longer legs, and less-stiffened tail-feathers than in the ordinary Flickers. In color it is grayish white above, transversely barred with blackish, the rump white, and the wings white with golden-yellow shafts, while the feathers of the tail are black throughout. It is a common species throughout this region, seeking its food and spending most of its time on the ground, and only occasionally clinging vertically to the trunk of a tree. When perched on trees they usually do so horizontally and crosswise like ordinary birds. For a nesting site they usually select old walls of mud or unbaked brick, banks along streams, or, when these fail, they may resort to the trunk of a tree. The eggs, some four or five in number, are pure white and deposited on slight rubbish at the bottom of the cavity. The note of this species, Mr. Barrows says, "is so loud as to be almost painful close at hand, and easily heard a mile or more away."

Green Woodpeckers. — Passing over a small genus (*Hypoxanthus*) of three species of Flicker-like birds of gaudy crimson and yellow plumage, which range from Venezuela to Bolivia, we come to the so-called Green Woodpeckers, in which the prevailing color of the plumage is green. They belong to several well-marked genera and are found in both the Old and New Worlds, and quite largely within the tropics. The common Green Woodpecker (*Gecinus viridis*) of Europe and eastern Asia may be taken as typical of the only genus inhabiting temperate regions. This bird is about thirteen inches long, has the upper parts olive-green and the lower parts greenish gray, while the rump is yellow, the face black, and the crown, back of the head, and mustaches crimson; in the female there is less crimson on the head and the mustaches are black, a difference that holds good between the sexes in all the species of the genus. The Green Woodpecker is a bird of great energy, frequenting woods, groves, and orchards, especially where conifers and hardwoods are intermixed, but rather shunning the pure coniferous forests as well as the denser woods. "It is," says Dresser, "active in its movements and most industrious in examining the bark of trees for its food, which consists of insects of various kinds; it will also eat acorns and nuts. Its flight is soft and undulating, but not prolonged." In the woods and parks of England and Wales it is still a not uncommon bird; its energetic manner, bright plumage, and loud notes make it ever an object of interest. It is rather noisy at all seasons, but especially so in spring, its "loud laugh" being likened to the words *plui, plui, plui, plui;* it has also a softer *yuck, yuck.* In the time of Chaucer it was known as the Yaffle, and in the southern counties of England this name still clings to it. Its nesting-hole is usually excavated in soft-wooded trees, and "is carried straight to the heart of the tree, then extended downward to the depth of about a foot." The eggs are from about four to seven in number, and the same nest is often used for several years.

In Portugal and Spain its place is occupied by the closely allied Sharpe's

Green Woodpecker (*G. sharpei*), which differs in having the lores and face slate-gray instead of black, while in Morocco and Algeria occurs the Algerian Green Woodpecker (*G. vaillanti*). The remainder of the twenty-two species spread far to the eastward in the Himalayas, and the Indian region, and as far as Japan, some nine or ten occurring in India proper. All have habits similar to those of the species first described, except that perhaps some of the eastern species seem to spend rather more time on the ground. Throughout the Ethiopian region occurs the genus *Campothera*, of which over twenty species are recognized. They are smaller birds than the true Green Woodpeckers, being about eight inches long, though some hardly exceed six inches, and have shorter, more rounded wings than their nearest relatives, the American Green Woodpeckers. As the habits of all are similar so far as known, we may mention only the Golden-tailed Woodpecker (*C. abingdoni*) of southeast Africa. The upper parts are olive-green, the crown crimson, the lower back and rump being white-barred, and the back, coverts, and wings more or less spotted with yellowish white; the tail-feathers are dark brown, and the shafts golden-yellow, while the lower parts of the body are pale sulphur-yellow more or less black-spotted; the length is seven and a half inches. Of the habits as observed in Natal, Mr. Ayres says: "These Woodpeckers are to be found throughout the Colony, wherever there is bush-land, singly or in pairs; their note is loud and harsh; they are very restless in their habits, constantly hunting for food as if they never obtained a sufficiency; their flight is heavy and dipping." Their nest-holes are similar to those of other Woodpeckers.

Several related genera of South America are *Chloronerpes* with eighteen species, and *Chrysoptilus* with eight species, while in India, Burma, and Java occurs the genus *Chrysophlegma* with eleven species. The latter genus differs from the true Green Woodpeckers (*Gecinus*) in the more curved and blunter bill and yellow crest, the sexes being distinguished by differences in the color of the chin and malar region instead of the crown.

Red-headed Woodpecker. — One of the most striking and familiar of the smaller Woodpeckers of the New World, is the beautiful Red-headed Woodpecker (*Melanerpes erythrocephalus*) of the eastern United States, which may be taken as typical of the genus *Melanerpes*, the thirty-five forms of which range over the United States and Canada, and thence through Central America and the West Indies into South America as far as Argentina and Uruguay. The Red-head, a bird about nine and a half inches in length, has the head, neck, throat, and upper breast a uniform rich crimson, the back, wing-coverts, and scapulars glossy blue-black, while the terminal half of the secondaries, rump, upper tail-coverts, and all the lower parts are pure white, the lower abdomen sometimes tinged with orange or reddish. The Red-head frequents open woodland, or along streams, solitary trees in fields and pastures, fences along roadsides, and in the treeless prairie lands of the West is often seen on telegraph poles, in which it not infrequently excavates its nest-hole. While more or less migratory, its movements appear to depend upon the food supply rather than extremes of temperature, since if its supply of beechnuts holds good, it may

pass the winter as far north as the southern Adirondacks in New York and in the northern New England States. It is a very omnivorous feeder, subsisting during the summer on various insects, especially grasshoppers, ants, beetles, and flies, the latter often taken on the wing, but it rarely digs in solid wood for the wood-boring larvæ; later it makes use of a great variety of fruits, nuts, and seeds, such as cherries, apples, peaches, grapes, blackberries, raspberries, mulberries, and Indian corn in the milk, while in late fall and winter it feeds largely on beechnuts, acorns, dogwood berries, etc. It has the habit of storing up food, both animal and vegetable, in cracks of posts, rails, crevices of buildings, and holes in trunks of trees. But its most remarkable food habits are exhibited in its unmistakable cannibalism, since it is known to eat both eggs and young birds of various species, such as Bluebirds, Titmice, Swallows, etc. Many instances of this kind could be mentioned, but we will quote but one, a brief statement by Mr. W. G. Smith, whose observations were made along the eastern base of the Rocky Mountains in Colorado. He says: "I consider it a veritable butcher among our Nut-hatches and Chickadees, driving every one away from its nesting sites, and woe to the bird that this villain can reach. It destroys both eggs and young, dragging the latter out of their nests and frequently leaving them dead at the entrance of their holes."

The Red-head is a rather noisy bird, especially during the nesting season, and selects a great variety of places for its nest-burrow, such as the trunks and limbs of all kinds of trees, posts, telegraph poles, or under the roofs of houses, or "any dark corner it can find." The eggs are usually five in number, though the range is from four to seven.

Other species of the genus that are worthy of mention is the Red-bellied Woodpecker (*M. carolinus*) of the eastern United States mainly south of Maryland, and South Dakota, and the handsome Lewis's Woodpecker (*M. torquatus*) of the western United States, the latter sometimes placed in a separate genus (*Asyndesmus*) and distinguished at once by the rich, dark crimson and quite bristle-like feathers of the under parts.

Sapsuckers. — Entirely confined to North America are the Sapsuckers (*Sphyrapicus*), of which some four or five forms are recognized, and which are anatomically distinguished by the absence of the long, extensile tongue so characteristic of most Woodpeckers. Belonging to that section of the family in which the first primary is very small, the Sapsuckers have the general upper plumage black, more or less varied with white, and the lower parts plain yellowish or white, with a large crescentic patch of black on the chest, while there is more or less crimson on the head and on the throat only in males (except *S. ruber*). Perhaps the best-known species is the Yellow-bellied Sapsucker (*S. varius*) of northern and eastern North America. It is distinguished by the brownish white nape, black chest patch, and stripes of white on the sides of the head; the length is about eight and a half inches, the sexes being nearly alike in plumage, the female, however, having a white instead of red throat. The favorite haunts of this species are deciduous and mixed woods, especially along streams and the borders of lakes and swamps, and in certain parts of the country, such as the Adirondack

wilderness, it is the commonest Woodpecker. Its ordinary note is a sort of whining "*whäce*," whence it is sometimes called the Whining Woodpecker; it is not, however, a very noisy species. Nevertheless, it is not in very good repute on account of its propensity for boring numerous rows of holes in the trunks and limbs of fruit, shade, and ornamental trees; in fact, it has been known to cause the death of valuable trees by completely girdling them. This tapping of trees is usually done in the spring when the sap is flowing freely, and the birds are known to feed on the sap, as well as on the tender inner bark, and doubtless on the insects attracted to the store of sweets. It also searches quite industriously about the bark for insects, but will rarely attempt to dig in solid wood. Berries, fruit, and seeds are made use of for food, but only when hard pushed by hunger will it turn to acorns and other nuts. The late Mr. Frank Bolles published some very interesting observations on this Sapsucker and its method of drilling the holes and making use of the flowing sap. He says: "The Sapsuckers' 'orchard' consisted of about a dozen canoe birches and red maples, most of which were dead, some decayed and fallen. The tree most recently tapped was a red maple about forty feet high and two feet through at the butt. The drills made by the Woodpeckers began eighteen feet from the ground and formed a girdle entirely around the trunk. This girdle contained over eight hundred punctures and was about three feet high. In places the punctures or drills had run together, causing the bark to gape and show dry wood within. The upper holes alone yielded sap. From this I inferred that what the birds obtained was the elaborated sap descending from the leaves through the fibers of the inner bark. I tasted the sap and found it unmistakably sweet. . . . The next day I watched from 9.30 until 1. The male, female, and one young bird were present, the tree being seldom left by all at once. During the morning the female drilled four or five new holes. They were above the others in perpendicular series. They yielded sap freely. She was closely attended by the young one, who occasionally swallowed pieces of the soft bark or cambium layer taken from the bottom of the drills. The female also ate some of it. When not drilling or resting, the female dipped sap from the holes near by. The male drilled no holes, but dipped in those yielding sap. The dipping was done regularly and quite quickly, often two or three times in each hole. The sap glistened on the bill as it was withdrawn. The bill was directed toward the lower, inner part of the drill, which, as I found by examinations, was cut so as to hold the sap."

The other forms of the genus are the Red-naped Sapsucker (*S. v. nuchalis*), distinguished by its reddish nape, which inhabits the Rocky Mountain districts and thence south into the mountains of Mexico; the Red-breasted Sapsucker (*S. ruber*), which is without the black patch on the chest and the white stripes on the head, the latter together with the neck and breast being red; and the Williamson's Sapsucker (*S. thyroideus*), in which the rump is plain white instead of mixed with black as are all the others, and the sexes exceedingly different in color, the male being mostly blue-black with a red stripe on throat and yellow belly, the female brownish, with upper parts barred with black and white. Both occur in the western United States.

Pied Woodpeckers. — We have now come to the largest and most widely distributed genus (*Dryobates*) embracing the so-called Pied Woodpeckers, of which our Hairy and Downy Woodpeckers may be taken as representative examples. They are small or medium-sized birds, which are black or brown above, more or less spotted or varied with white, and whitish below; in the adult male there is considerable red on the head, but this is lacking in the female. About twenty of the fifty-five or more forms now recognized are found in the New World, principally the United States, while the remainder are widely spread over the Palæarctic and Indian regions. In North America, where the genus has been very thoroughly studied, it has been found that most of the species are divided up into a number of fairly well marked geographical races, and it seems probable that when the Old World forms are investigated as carefully, it will appear that similar conditions prevail.

Great Spotted Woodpecker. — This genus is capable of division into three well-marked sections based on the coloration of the back and rump, these areas in the first group being a uniform black or brown without any white. To this belongs the Great Spotted Woodpecker (*D. major*) of Europe and Asia Minor, whence it ranges through southern Siberia to Amur and Korea. It is a handsome and quite conspicuous bird, a rich blue-black above, with a crimson patch on the back of the head and a white spot on the sides of the neck, while the scapulars, lesser wing-coverts, and lower parts are white, becoming crimson on the lower abdomen and under tail-coverts; the female is without the crimson on the head; the length is nine and a half inches. It is a shy, rather solitary bird, keeping much to the tops of the trees and not often seen unless especially searched for. It frequents parks, woodlands, and forests, and is not at all a noisy species, almost its only note being a sharp *tick* or *tschick*, while in spring it produces a loud drumming or rattling sound by rapid hammering on the limbs or trunks of dead trees, a noise that is audible for a considerable distance. It feeds largely on insects, but is also considerable of a vegetarian, taking in season various fruits, nuts, and seeds. The eggs are six or seven in number. To the eastward are spread a number of closely related species, which careful study may show to be only geographical races.

Hairy Woodpeckers. — To the second group of species, in which the back is striped or marked longitudinally with white, belongs the well-known Hairy Woodpecker of North America. The typical form (*D. villosus*), which inhabits the eastern United States, with the exception of the South Atlantic and Gulf States, is a bird eight and a half or nine inches in length, black above with a scarlet band on the nape, a broad white band down the middle of the back, and a white stripe above and below the eye, the under parts being white and the wings conspicuously white-spotted; the female is without the crimson nape. This is a bird of hardy nature, usually a constant resident where found, and no matter how intense the cold, it seems to find plenty to eat. It is of rather solitary disposition, its favorite haunts being woodlands, river bottoms, and forests, occasionally orchards and more open country. There is nothing especially remarkable about its habits of feeding or nidification. Of the geographical races there

is a smaller southern form (*D. v. audubonii*) with less white in the plumage, a very large northern form (*D. v. leucomelas*) which reaches a length of ten or eleven inches, and a large western race (*D. v. harrisii*) in which the wings are mostly without white spots and the lower parts smoky gray or brownish instead of white.

Downy Woodpeckers. — The Downy Woodpecker (*D. pubescens*) is almost an exact copy in miniature of the Hairy, the only difference except size being the barred instead of the plain white outer tail-feathers; the length is between seven and eight inches. A resident where found, the Downy is a much more abundant and familiar bird than its larger relative, coming fearlessly to the orchard and shade trees about houses, where its cheery tap and peck is heard with the accompaniment of Warblers and Vireos in summer, and Chickadees and Nuthatches in winter. Its favorite resorts are open woodlands and orchards, and here it may be seen industriously searching for insects, now and then delivering a few sharp blows to dislodge some promising piece of bark. Its nest-holes, often in an old orchard or woodland tree, are models of Woodpecker architecture and contain from four to six eggs. The Downy Woodpecker has recently been divided into several geographical races, among them a smaller southern form (*D. p. meridionalis*), a large Alaskan form (*D. p. nelsoni*), and a less spotted western race known as Gairdner's Woodpecker (*D. p. gairdnerii*).

Lesser Spotted Woodpecker. — The members of the final and largest group of species have the back and rump barred with white. Within this group falls the common Barred or Lesser Spotted Woodpecker (*D. minor*) of Europe and thence to Japan. It is a small species only five and a half inches long, and is not a very conspicuous element in the bird life, even where tolerably common, on account of its retiring habits. It affects groves of deciduous trees as well as orchards and is active and restless, seeking its food of insects assiduously. In North America there are a number of forms belonging to this group, though they do not at all belong to the same section as *D. minor*, what little resemblance there may be being purely superficial, among them the Ladder-back Woodpecker (*D. scalaris*), so named from the numerous bars across the back, and Nuttall's Woodpecker (*D. nuttallii*) of California, but their habits are hardly worthy of more extended notice.

Three-toed Woodpeckers. — Allied to the last, but distinguished at once by having only three toes, and a yellow instead of a crimson patch on the crown, are the Three-toed Woodpeckers (*Picoides*), of which some ten forms are recognized, all birds of Arctic or Alpine regions. Of the six North American forms we may select the Arctic Three-toed Woodpecker (*P. arcticus*) for notice, this being perhaps the best known. It is glossy blue-black above, relieved by the bright yellow patch on the crown, and white below, the sides barred with black, the wings spotted with white, and a line of white passing from the nostril below the eye; it is nine and a half or ten inches long. It is an active, restless bird, confined to the northern portions of the continent, mainly north of the United States, its favorite haunts being the dense forests of spruce, fir, and tamarack, and if a burnt tract of these trees is available, it may usually be found among

them. It confines its attentions mainly to the upper sections of the trees, and although not particularly shy, its habitual restlessness makes it difficult to approach. Its flight is "rapid, gliding, and deeply undulating," and is often protracted for a considerable distance. Its food consists almost entirely of wood-boring insects and their larvæ, and the nest hole is usually excavated in a coniferous tree.

White-headed Woodpecker. — In the higher mountain ranges of western North America, among the forests of pine and fir, occurs the home of the remarkable White-headed Woodpecker (*Xenopicus albolarvatus*), the only representative of its genus. It shares with the Sapsuckers the deficient hyoid apparatus, its tongue being less extensile than in most other members of its family. About nine inches in length, the plumage is uniform black, except the head, neck, upper part of the chest, and the base of the wing-quills, which are white, the head being further set off by a band of bright red across the back. It is resident or nearly so where found, and is described as a rather silent, more sedate, bird than most of its relatives, its only note being a sharp *witt-witt*. Of its habits as observed near Fort Klamath, Oregon, the late Dr. J. C. Merrill said: "I have rarely heard this Woodpecker hammer, and even tapping is rather uncommon. So far as I have observed, and during the winter I have watched it closely, its principal supply of food is obtained in the bark, most of the pines having a very rough bark, scaly and deeply fissured. The bird uses its bill as a crowbar rather than as a hammer or chisel, prying off the successive scales and layers of bark in a very characteristic way. This explains the fact of its being such a quiet worker, and, as would be expected, it is most often seen at the base of the tree, where the bark is thickest and roughest. It must destroy immense numbers of *Scalytidæ*, whose larvæ tunnel the bark so extensively, and of other insects that crawl beneath the scales of bark for shelter during winter." The young, according to a correspondent of Bendire's, are fed entirely on large black ants which cover the dead pines and stumps at this season.

Great Gray Woodpecker. — Passing over the small, very short-tailed Cardinal Woodpeckers (*Dendropicus*) of Africa, the Pygmy Woodpeckers (*Iyngipicus*) which are widely spread throughout the east and reappear in Senegambia and northeast Africa, the Bay Woodpeckers (*Pyrrhopicus*) of Indian regions, the Barred Woodpecker (*Miglyptes*) of Burma and the Malay countries, and the Rufous Woodpeckers (*Micropternus*) of the Oriental regions, which are not of particular or striking interest, we come to Hargitt's second division of the family; namely, those in which the neck is very much narrowed and covered with compressed plumage, thus making the head appear extraordinarily large. Here are included the largest representatives of the whole family, among them the splendid Great Gray Woodpecker (*Mulleripicus* or *Hemilophus pulverulentus*), which ranges from the base of the Himalayas, throughout Burma, Cochin China, Sumatra, Java, and Borneo. This bird, the only member of its genus, is nearly or quite twenty inches in length, with a bill three inches long. In color the plumage is ashy gray, paler on the head, which is ornamented on the back with a large patch of crimson, while the chin, throat, and fore neck are saffron-yellow

tinged with red. "This grand Woodpecker," says Mr. Blanford, "is a denizen of high forests, and especially of hilly tracts, and is generally seen high up the stems and upper branches of trees, keeping in small parties of from three or four to ten or twelve, and very noisy, often uttering a peculiar querulous call." The entrance to the nest-hole is some three and a half inches in diameter, and the eggs are one and forty-one hundredths by one and eleven hundredths inches in size.

Black Woodpecker. — Quite closely allied to the last are the great Black Woodpeckers (*Thriponax*) of India, the Malay countries, and thence to the Philippines and Korea, which differ principally in possessing a well-defined nuchal crest. About a dozen species are known, all of large size, and, as the common name indicates, are mainly black in color, though most of them show some white on the body. The Malabar Great Black Woodpecker (*T. hodgsoni*) is a bird some nineteen inches long, inhabiting the dense evergreen forests of the Malabar coast, and going about in pairs or small parties.

Ivory-billed Woodpeckers. — Of the American representatives of this thin-necked, large-headed group, mention must be made of the splendid Ivory-bills

FIG. 174. — Ivory-billed Woodpecker, *Campephilus principalis*.

(*Campephilus*), of which more than a dozen species are known, ranging from the southern United States through Cuba, Central America, and South America to Uruguay and Argentina. The typical Ivory billed Woodpecker (*C. principalis*) is principally glossy blue-black, with the shoulders, secondaries, and a stripe on each side of the neck pure white, and a splendid crest of scarlet; the bill is ivory-white, whence of course the name; the length is twenty or twenty one inches. The female is similar, but has the crest blue-black instead of scarlet. This species was formerly distributed, though not very abundantly, from the southern Atlantic and Gulf States northward to North Carolina, Missouri, and southern Indiana, but it is now exceedingly rare, perhaps on the verge of extinction, and is mainly confined to the cypress swamps of southern Florida and the lower Mississippi Valley. It is ever a wild and suspicious bird, quickly retiring before the advance of civilization and finding refuge in the dense, all but impenetrable, swamps of the extreme south. It is also a very silent bird, especially during the breeding season, and is said not to make a sound at this time. It, however, drums loudly as a call for its mate. Its food consists of wood boring insects, in securing which it shows great energy, as well as skill. "The nest," says a correspondent of Major Bendire, "is generally placed in a cypress or tupelo gum tree, one that is practically dead being preferred, and the cavity is excavated in the dead part of the tree. I have never found a nest in wood in which there was sap, or in rotten wood."

Another species of this genus is the Imperial Woodpecker (*C. imperialis*) of western Mexico, which is even larger than the Ivory-bill, having a length of twenty-three or twenty-four inches; it is similar in plumage, but lacks the white stripes on the sides of the neck.

The **Pileated Woodpecker**, Cock of the Woods, or Logcock (*Ceophlœus pileatus*), as it is variously called, is the representative selected of the other American genus of large Woodpeckers. It is about seventeen inches long, of a uniform dull dusky slate color or sooty blackish, with the chin, throat, two stripes on the side of the head, one on the side of the neck, and the basal half of the quills white, somewhat tinged with sulphur-yellow; the whole top of the head, including a prominent crest, and in the male a broad stripe on the lower jaw, is scarlet. This species is found in heavily wooded districts throughout the whole of North America, and has recently been separated into two geographical races,—the southern, which is the typical form, and a northern (*C. p. abieticola*), which is somewhat larger and has a more extensive area of white. The southern race is still quite abundant in the heavily forested regions of Florida and the Gulf States, but the northern form is much less abundant than formerly, disappearing as the forests have been removed. In localities where it has been much hunted it has become exceedingly shy and wary, but in other places, especially in the South and West, it is not particularly wild. Its flight, when not hurried, is rather slow and Crow-like, but at other times it is both strong and swift; at all times it is more direct and not so undulating as in most Woodpeckers. The nesting site is usually a dead tree in extensive woods, and is almost always located in the main trunk. The entrance is three or three and a half inches in diameter,

and may go in four or five inches before turning downward; the depth varies from eight to thirty inches, the lower portion being enlarged into a chamber some six inches in width. The usual number of eggs is three to five, but six and even eight have been reported.

Piculets. — The second of the two groups into which, as already pointed out, it is possible to separate the Woodpeckers, comprises only the Piculets, or those with the soft tails. They are diminutive birds, between three and five inches in length, and are most abundant in South America, but curiously enough they also reappear in the Orient, and a single species inhabits the Cameroons and Gaboon country of West Africa. How they came to be so widely separated is difficult to say, since no fossil representatives have thus far come to light, but in any event this distribution points to the considerable antiquity of the group. Aside from the flexible tails, they are distinguished by a rather soft, lax plumage throughout, while the nostrils are covered with dense plumes and bristles, and, according to Parker, the palatal structure is of a less developed type than in the typical Woodpeckers. They are also said to climb less like Woodpeckers, but perch after the manner of true perching birds, yet in the manner of their food and nesting habits they remain true Woodpeckers.

About forty-three species are recognized as belonging to this group, and these are disposed among four, or possibly five, genera, as there are some differences of opinion as to whether certain of the Oriental species should be referred to the same genus with the South American forms. The American genus (*Picumnus*) is the principal one, embracing thirty-five species, and Hargett, Sharpe, and Blanford are unable to detect any generic difference between these and the two Oriental species, "the resemblance being carried even to the pattern of the tail." Some authorities would place the latter in the genus *Vivia*, but be this as it may, the differences, if they exist, are but slight. Although the American forms are so numerous, very little has been recorded of their habits beyond the fact that they are thorough Woodpeckers. The color of the plumage is largely olive-green, rufous, or gray, often more or less spotted or barred with black below, and showing yellow or red on the head. The species called the Spotted Piculet (*Picumnus* (or *Vivia*) *innominatus*), which ranges all through the Burmese provinces, and parts of the Malay peninsula to Sumatra and northern Borneo, is a bird about four inches long, olive or yellowish olive above, with the chin and throat white and the abdomen pale yellow, all with large black spots. This bird, according to various authorities, frequents tangled thickets of brushwood or bamboo, or dead and fallen trees in damp places, and feeds on insects. "It breeds in April or May," says Mr. Blanford, "making a hole precisely like that of a typical Woodpecker, sometimes in the stem, sometimes in a branch of a tree, and lays usually three eggs, oval, white, and very glossy."

In Haiti and Santo Domingo occurs a monotypic genus (*Nesoctites*) which differs from the last in the larger size, a more slender and curved bill, longer upper tail-coverts, and longer posterior toe. The single species (*N. micromegas*) is olive-green above, brownish on the wings, and pale yellowish below, where it

is thickly spotted with brownish black; the top of the head is bright yellow, cut by a band of red. Of its habits as observed in Haiti, Mr. Cory says: "Its habits resemble those of a Woodpecker; it climbs about the trunks of trees in search of food. It has a short, sharp note, generally uttered while flying. The nest is built in a hole in a tree."

The Rufous Piculets (*Sasia*), of which three Old World species are known, are distinguished at once from all the other members of the group by wanting the first toe, and in having a naked space around the eye; the coloration is also very different from that in *Picumnus*. In the Himalayan species (*S. ochracea*) the plumage is rufous-olive above, becoming bright orange-brown on the rump, and brownish rufous or orange-brown below, the nasal plumes and forehead being golden yellow in the male and brownish in the female; the length is a little more than three inches. It is a solitary bird, usually observed singly or in pairs, and frequents the brushwood and bamboo thickets, where it secures its food of insects. The nest-hole is usually excavated in a bamboo, sometimes in a tree.

The Wrynecks (Subfamily *Iyngin*æ).—The second subfamily of the *Picid*æ comprises a single genus (*Iynx*) and four species, the so-called Wrynecks, and all are natives of the Old World. They are obviously related to the Piculets, having the same soft, flexible tail-feathers, but the tail is relatively longer, and the large nostrils are not covered by plumes, but are partially hidden by a membrane. The conical, compressed bill is of moderate size, while the hyoid apparatus is well developed and the tongue as extensile as in many of the true Woodpeckers, but it is not barbed at the tip, as is often the case in the latter. The plumage is soft, brownish gray in color, finely mottled or vermiculated above with brown and black lines; the sexes are similar, and the length between six and eight inches. The common name of Wryneck is derived from the curious habit of elongating the neck and twisting the head, and when disturbed, especially when in its nesting hole, it utters a loud hissing sound, whence in England it is often called the Snake Bird. The Wrynecks do not climb about the trunks of trees, as their tails are too weak to support them, though they often cling to the trunks while in search of their food.

Fig. 175. — Common Wryneck, *Iynx torquilla*.

The Common Wryneck (*Iynx torquilla*) is distributed over much of Europe and Asia, wintering in northern Africa, the Indian peninsula, and China. It is not an uncommon summer visitor to England, where, in addition to its other names, it is also called the Cuckoo's mate, from the fact that it precedes the

coming of that bird, and the Pee-pee from the likening of its note to the words *pee, pee* or *qui, qui, qui.* It frequents low trees and bushes, especially orchards, or even high grass, and is frequently observed on the ground seeking its food, which consists largely of ants and ground-haunting insects, which are secured by rapid darts of its worm-like tongue. At all times except during the nesting season it is a silent bird, but at that time its loud, monotonous, quickly uttered call is frequently heard. It does not excavate a hole for itself, but makes use of a natural or other cavity, especially in an orchard or lime tree, depositing on the bare wood or chips at the bottom its glossy white eggs, which number from seven to nine, or exceptionally as many as twelve.

The remaining species are confined to Africa south of the Sahara. Of these the Red-breasted Wryneck (*I. ruficollis*), so named from the deep chestnut color of the center of the chin and throat, inhabits South Africa, the White-breasted Wryneck (*I. pulchricollis*) equatorial Africa, and the other (*I. æquatorialis*) Abyssinia. Their habits are similar to those of the better-known species.

CHAPTER XXVI

THE SPARROW-LIKE BIRDS

(Order *Passeriformes*)

E have now come to the last, but by no means the least, of the twenty-one orders into which birds are here divided, for within its limits are included approximately seven thousand species and subspecies, or nearly half of all known birds. To give these the general designation of Sparrow-like birds implies a more or less close resemblance to a typical Sparrow, but as a matter of fact only a comparatively few would probably be so recognized by the casual observer, and it is to be understood as standing, in the absence of a better popular term, for the general passerine type, the actual resemblance between them being often confined to agreement in minute, though relatively important, anatomical characters.

The difficulties of satisfactorily dividing and arranging this vast assemblage are well set forth by Mr. Robert Ridgway, who says: "Notwithstanding this enormous number of specific forms, the type of structure is remarkably uniform, and the group far more homogeneous than the lower groups of equal rank. Consequently, subdivision of the *Passeriformes* becomes a matter of extreme difficulty, and no arrangement has thus far been proposed which can be considered entirely satisfactory. Indeed, it seems impossible to subdivide the order, beyond a very limited extent, into lesser groups, which are equivalent in taxonomic rank to the families of other orders, and the extent to which this may be done is a matter concerning which systematists differ widely in their views. . . . It may be, and doubtless is, perfectly true that no more than three passeriform groups can be defined which will be equal in taxonomic rank to the families of other orders of birds; but the objection to this meager allowance — and it is a very serious one — is that two of the three groups contain together only about one fifth the total number of the species, so that there are still left about five thousand species in the third. Obviously, these five thousand species (more or less) must be susceptible of segregation into a considerable number of more or less trenchant groups; and there being so few grades of rank between a family and a genus, what to call these groups becomes a very serious question."

As a provisional expedient, largely in the interest of convenience and pending fuller knowledge, Mr. Ridgway proposes to designate the "families" of

Garrod as "*superfamilies*," and to retain the term "*family*" for "such groups of genera as can be trenchantly separated from all others," that is, for the groups ordinarily recognized as families.

It is not deemed necessary in the present connection to go into a history of the attempts that have been made to satisfactorily classify the *Passeriformes*, especially in view of the fact that the anatomy and structure of a great number of forms, sometimes embracing whole "families," are practically unknown, and until this knowledge is somewhere near complete all classifications of the group must be regarded as more or less provisional and tentative.

Passerine birds are in general of small or medium size, with variously shaped wings in which there are nine or ten primaries, the outermost being frequently rudimentary and nearly or quite concealed, nine secondaries, and usually twelve (rarely ten or fourteen) tail-feathers. Of the numerous structural characters it may be mentioned that the feet are four-toed,[1] the first toe (hallux) being on the same level as the others and directed backward, while the second, third, and fourth toes are directed forward; the muscles presiding over the small toes are also peculiar, but need not be here described. The skull is ægithognathous, the basipterygoid processes absent, only the left carotid artery present, and the metasternum is usually two — rarely four — notched, while the oil-gland is naked and the cæca present, though usually small. The muscles of the syrinx or the voice organs exhibit a peculiar structure and, as will be shown subsequently, serve as a means of defining several of the great groups.

Following the classification of Garrod and Forbes, which seems to possess advantages over others proposed, the order *Passeriformes* is first divided into two suborders: the *Desmodactyli*, in which the first or hind toe (hallux) is weak, the front toes more or less united, and the deep plantar tendons of the foot desmopelmous, that is, having the three-branched tendon which supplies the front toes united by a band or vinculum at its point of crossing with the tendon which supplies the hind toe. This includes only the superfamily *Eurylæmidæ*, or Broad-bills.

In the second suborder — the *Eleutherodactyli* — the hind toe (hallux) is the strongest toe, the feet eleutherodactyle or with the front toes usually free, and the deep tendons of the foot schizopelmous, or without the band or vinculum at the crossing point of the tendons supplying the front and hind toes. This suborder embraces practically all passerine birds and is divided into three superfamilies: the *Clamatores*, in which the muscles of the syrinx are anisomyodous, that is, with these muscles "unequally inserted, either in the middle or upon only one or the other (dorsal or ventral) ends of the bronchial semirings," and the *Pseudoscines* and *Oscines*, in which the syringeal muscles are diacromyodous, or with the muscles "attached to the dorsal and some to the ventral ends of the bronchial semirings, these ends being, so to say, equally treated." In the *Pseudoscines* there are only two or three pairs of these syringeal muscles, while in the *Oscines* there are four or five pairs.

[1] Except in *Cholornis*, in which the fourth is abortive.

THE UNITED-TOED PERCHING BIRDS

(Suborder *Desmodactyli*)

The characters of this suborder have already been set forth. It includes only

THE BROAD-BILLS

(Superfamily *Eurylæmidæ*)

As so frequently happens in groups representing anomalies of structure, there are differences of opinion as to the correct systematic position, some having placed the present group among picarian birds and near the Puff-birds, while others have supposed them to be related to the Flycatchers; but since the researches of Garrod, Forbes, and others, the *Eurylæmidæ* have been shown to have a close alliance with the passerine group, of which they are now regarded, at least provisionally, as forming a distinct suborder as well as superfamily. More recently Pycraft has studied the osteology of the group and has found that in addition to the primitive characters usually recognized, it is really an extremely specialized group, this specialization being particularly conspicuous in the skull. His conclusion is that the *Eurylæmidæ* belong with the *Passeriformes*, and further that there seems scarcely sufficient ground for separating them so widely from the remaining *Passeres* as is usually done. "It is quite possible," he adds, "that further investigation will show that the *Eurylæmidæ* are entitled to rank no higher than a subfamily of the *Cotingidæ*." They are confined entirely to the Old World, where they seem to take the place of the New World Cotingas, which they so much resemble. They may once have been more numerous, but from their present small numbers and restricted distribution they must be regarded as a waning type. They are small birds, approximating eight or ten inches in length, with very broad, flat bills, as in some Flycatchers, whence their common name of Broad-bills. They have rather rounded, often graduated tails, but the most pronounced characters are in the feet. While these are adapted for perching, the tendons are of the desmopelmous type, with the hind (first) toe very large, and the front toes more or less joined at base, the outer and middle (third and fourth) ones having only the terminal phalanx free. They agree with most *Passeriformes* in the nude oil-gland and two-notched sternum, but differ in the unforked *manubrium sterni*.

The Broad-bills are forest-loving birds, haunting the tops of the highest trees and usually going about in small parties. In disposition they are very tame and unsuspicious, not to say stupid, in which respect at least they resemble the Puff-birds, and like them permitting several members of a flock to be killed one after another without those remaining taking alarm. Their food consists largely of insects, although one species is said to subsist entirely on fruits. Their nests are among the marvels of bird architecture, being large, round

affairs woven of slender grasses, rootlets, and various fibers, and suspended by a slender thread from the ends of slender branches, often overhanging water. The entrance is on the side and is often provided with a rude porch or protected by an overhanging portico, while some are supplied, perhaps for purposes of ornament, with a long tail sometimes three feet in length. The eggs

Fig. 176. — Long-tailed Broad-bill, *Psarisomus dalhousiæ*.

are three or four in number, white or cream-colored, either spotless or more frequently much speckled, especially on the larger end.

The sixteen species of Broad-bills disposed among seven genera are confined to the Oriental region, ranging from the western Himalayas over the Malay Peninsula to the Philippines, Sumatra, and Borneo. Many of them are very bright colored birds, each genus exhibiting a distinct coloration. In the typical genus (*Eurylæmus*) the bill is large, broad, and flat, with the sides of the upper mandible convex and overhanging, — characters which it shares with the monotypic genus *Corydon*, but from which it differs in having the region below the eye feathered. In *Eurylæmus*, which embraces two species, the

plumage above is mainly black and yellow, while the lower parts are chiefly vinaceous red. In Horsfield's Broad-bill (*E. javanicus*) the breast in the male is crossed by a narrow black band, which is absent in the female; the length of

Fig. 177. — Frilled Broad-bill, *Serilophus lunatus*.

the bird is nine inches. This species is said to feed on insects and small reptiles, but otherwise exhibits the typical habits of the group. A nest found by Mr. Davison was a "massive structure composed of moss, fibers, roots, dry leaves, bits of wood and small twigs, suspended to the extreme tip of a very tall bamboo overhanging water." The other species, the Black-and-Yellow Broad-bill

(*E. ochromelas*), is much smaller, being only six and a half inches long. In the Dusky Broad-bill (*Corydon sumatranus*) the plumage is mainly black throughout, the exception being a white wing-bar, a subterminal spot of white on all but the middle pair of tail-feathers, and a concealed patch of crimson in the interscapular region; its length is ten and a half inches. This species is described as being somewhat crepuscular, remaining quiet during the day and becoming more active at dusk.

Of the next four genera in which the bill is of much the same shape as in the last except that the upper mandible is not overhanging, we may mention the Long-tailed Broad-bill (*Psarisomus dalhousiæ*), which is distinguished by the very long, greatly graduated tail. The general color is bright green, with a patch of blue on the crown, and bright yellow on the chin, frontal space, lores, and behind the eye; it is ten and a half inches in length. The habits of this beautiful bird are similar to those of the other members of the family. The genus *Serilophus*, three species of which are now recognized, is similar to the last except that the tail is shorter than the wing and is much rounded, while the head is supplied with soft silky plumes. The best-known species, which has been selected for illustration, is the Frilled Broad-bill, or Frilled Tody (*S. lunatus*), as it is called by the Indian ornithologists, a native of Burma and Tenasserim. It is not so brilliant as many of the others, being pale brownish gray above, with the rump brownish chestnut, the wings black, crossed by a bluish and a white band, and the under parts white or nearly so. It is a retiring species, inhabiting the desert jungles and feeding largely on fruit. The final genus of three species (*Calyptomena*) is known at once by the smaller bill and dense tuft of forward-pointing loral plumes, which not only conceal the nostrils at the base of the bill, but the greater part of the upper mandible as well. The harsh plumage is a bright green nearly throughout. The Green Broad-bill (*C. viridis*) of India, whence it ranges over the Malay Peninsula, Sumatra, and Borneo, frequents the tops of the trees in pairs or small parties and feeds entirely on fruits, which it seeks only in the morning and evening. The other two species are found in the mountains of northwestern Borneo, Whitehead's Broad-bill (*C. whiteheadi*), for instance, being a very striking bird, the general color being a bright shining green, relieved on the front of the neck and behind the ears by blotches of black, while the back and breast are black, each feather with a lanceolate green tip; the tail is velvety black and the secondaries slightly edged with blue.

THE FREE-TOED PERCHING BIRDS

(Suborder *Eleutherodactyli*, Superfamily *Clamatores*)

The essential characters of this suborder have been set forth under the general discussion of the *Passeriformes* (p. 604). The suborder embraces three superfamilies, the first of which is the *Clamatores*, which includes the families *Pittidæ*

(Pittas), *Philepittidæ* (Asities), *Xenicidæ* (Rifleman and New Zealand Wrens), *Tyrannidæ* (Tyrant-birds), *Oxyruncidæ* (Sharp bills), *Pipridæ* (Manakins), *Cotingidæ* (Chatterers), *Phytotomidæ* (Plant cutters), *Dendrocolaptidæ* (Wood-hewers), *Furnariidæ* (Oven-birds), *Formicariidæ* (Ant-birds), *Conopophagidæ* (Ant-pipits), and *Pteroptochidæ* (Tapacolas).

THE PITTAS

(Family *Pittidæ*)

The Pittas form a compact group of about sixty species of small, often brilliantly colored Thrush-like birds confined essentially to southeastern Asia, with a few extending into Australia and three closely related representatives in Africa. They have long legs, the covering of the tarsus in front being entire and smooth, rather short, rounded wings with ten primaries, the first of which is of large size, and a very short tail composed of twelve feathers. The most important structural feature is afforded by the organs of voice, the intrinsic muscles of the syrinx being fixed at or near the middle of the bronchial semi-rings, thus excluding them from the true singing birds, where they were formerly placed. The feathers of the crown are more or less elongate and when erected form a conspicuous crest, although in all but one genus these frontal plumes are normally recumbent. A number of the species are partially migratory. The Pittas live almost entirely on the ground, where they run and hop with the greatest facility, most of them preferring the dense jungle, but some may be found in sparse bamboo jungle, gardens, or even comparatively open country. Their flight is quite strong for short distances, but they mostly prefer to escape danger by running, and they disappear with astonishing quickness in the dense tangle of vegetation. They feed almost entirely on insects, worms, and snails, and although not especially notable as songsters the males have a very sweet call, consisting of a peculiar double whistle, which they utter frequently from a low tree. They build large, oven-shaped nests either on the ground or in thick bushes, or branches near the ground, and lay four or five white eggs which are richly marked with reddish, purplish, etc.

Of the five genera now recognized the first to be considered (*Anthocichla*) is characterized by a rather long, compressed bill, and by the feathers on the sides of the nape being long, pointed, and forming conspicuous aigrettes. The single species, known as Phayre's Pitta (*A. phayrei*), is found in Tenasserim and the Karen Hills, and is a quietly handsome bird about nine inches in length with the plumage mainly clear brown throughout, with a broad black band over the center of the head and down the nape, while the middle of the throat is white and the sides and flanks marked with black spots. The female is similar, but lacks the black on the head and nape, and is more spotted below. This appears to be a very rare bird, and little is known of its habits beyond the fact that it frequents moderately thin tree jungle, and builds the typical domed nest on

the ground at the foot of a tree. The eggs, four in number, are glossy white, spotted with purplish black mainly at the larger end.

A group of four species of large size, separated from the true Pittas under the name of *Hydrornis*, have the predominant color of the plumage brown and the sexes similar. Of these perhaps the best-known is the Blue-naped Pitta (*H. nipalensis*) of the eastern Himalayas and Burma. It is a bird about ten inches long and, in addition to the prevailing brown color, has the hinder part of the head and the nape blue. Closely allied is the Fulvous Pitta (*H. oatesi*) of Burma and Tenasserim, which has the nape deep brown. According to Mr. Oates both these species frequent the dark gloomy ravines of the evergreen forests,—spots where the sun seldom penetrates except at midday, and where the vegetation is extremely dense and the ground constantly damp. They feed on worms and large insects, and seldom leave the ground except to mount on a fallen trunk or low branch. They build the usual covered nest of grass and leaves on the ground or in a tangled mass of branches of trees a short distance above the ground.

In the typical Pittas (*Pitta*), which number over fifty species, the bill is shorter and less compressed than in those first mentioned, and the tail is short and more or less squared. Many of them are exceedingly brilliant, such, for example, as the Lesser Blue-winged Pitta (*P. cyanoptera*) of Burma, Siam, and the Malay Peninsula, which is dark green above, with a brown cap, black head and nape, brilliant blue rump, and black white-barred wings, while the throat is white, and the remainder of the under parts deep fawn-color except in the middle of the abdomen and the crissum, which are crimson. A Bornean species (*P. granatina*) is dull black, glossed with purple above, set off by a bright scarlet cap, and a purplish brown throat and a dull scarlet abdomen, while another gem (*P. baudi*) from the same island is crimson above, with the nape and sides of the head black, the crown, rump, and tail brilliant blue, and the wing-coverts with a pure white terminal band, while the throat and a spot on each side of the head is pure white and the breast black, passing into purple and blue on the abdomen. Their habits are similar and all construct the domed nests already described.

Equally brilliant are the five species of the genus *Eucichla*, which are distinguished from the last by the longer, sharp-pointed tail. Of these Gurney's Pitta (*E. gurneyi*) of Tenasserim and the northern portion of the Malay Peninsula is one of the most striking. It is clear brown above, with the front half of the head and nape black and the hinder half brilliant blue, the feathers pointed, while the wings are blackish brown, and the chin whitish, passing into bright yellow on the throat and neck and black on the abdomen, the flanks being yellowish barred with black. It is found in the deep evergreen forests, and is one of the forms that is more or less migratory. Differing from this in possessing a slightly longer tail, and a black instead of a blue crown, is the equally gorgeous Elegant Pitta (*E. boschi*), which has been selected as the subject of the colored plate; it is a native of the Malay Peninsula and Sumatra.

ELEGANT PITTA
(*Eucichla boschi*)

The remaining genus (*Mellopitta*), which is referred here with some doubt, embraces two species, both of New Guinea. They have long legs, a comparatively elongated tail, and a short, erect frontal crest; the plumage is uniform black throughout.

THE ASITIES

(Family *Philepittidæ*)

Madagascar is the home of two curious little birds that have been variously referred, but which appear to be most closely related to the Pittas, from which they differ, among other features, in having the tarsus covered with rectangular plates disposed in regular series. The sexes are very different in coloration, and the males are further distinguished by having the skin around the eyes bare of feathers and surmounted by a green or bluish green caruncle. They do not resemble the Pittas very closely in outward appearance and are described as being more arboreal in their habits. In *Philepitta jala*, which is about six and a half inches long, the male in mature plumage is a velvety jet-black, both above and below, though when this same plumage is freshly moulted the extreme tips of most of the body feathers are bright greenish yellow, but these soon wear off, leaving the intense black, except for a spot at the bend of the wing which remains bright yellow; the female is olive-green with numerous pale yellow markings below. In the other species (*P. schlegeli*) the male is olive-green above, becoming blackish on the head and darker on wings and tail and bright yellow beneath, the female being olive above with light stripes on the head and yellowish below; the length is only about five inches.

The first-mentioned species, known as the Black-velvet Asity, is confined to the forest regions of eastern Madagascar, where, according to Shelley, it is met with generally in pairs, running along or climbing up the branches in search of buds and fruit on which it feeds. It is graceful and active in its movements and not at all shy. The flight is strong and not sustained for any great distance, and the males have a soft, Thrush-like song. The eggs are bluish white in color.

THE RIFLEMAN AND NEW ZEALAND WRENS

(Family *Xenicidæ*)

Formerly placed among the singing birds (*Oscines*) and associated with the Creepers and Wrens — and they have very Creeper- and Wren-like habits and appearance — are several little New Zealand birds known as Rock Wrens, Bush Wrens, and the Rifleman; but some twenty years ago it was shown conclusively that the structure of their vocal apparatus precluded their being placed among the *Oscines*. They appear to be most closely related to the Pittas (though Pycraft has recently suggested the possibility of their being more nearly related

Fig. 178. — Black-velvet Asity, *Philepitta jala*.

to the Oven-birds [*Furnarius*]) from which they differ in having ten, instead of the usual number of twelve, tail-feathers, as well as in the arrangement of the scales on the tarsus. Only four or five species are known, these being disposed in three genera, all confined to New Zealand. Of these the Rifleman (*Acanthidositta chloris*) is not only the smallest but has the distinction of being the smallest bird known from New Zealand, being but three inches in length. The plumage is greenish above, tinged with brown on the forehead and white below tinged with yellowish in the flanks, and there is a white line over the eye, while the blackish tail is tipped with yellowish white, but the tail is so short as to be hardly visible when the bird is in motion. It is found rather abundantly throughout most of both the North and South islands, frequenting the sides and summits of the wooded ranges, where it is described as a very lively and active bird, being incessantly on the move, running up and about the trunks of the larger trees with quivering wings and prying into every chink and crevice with its slender, slightly upturned bill, uttering the while a low, feeble *cheep* like the cry of a young bird. Its powers of flight are feeble and it simply uses its wings for short passages from one tree to another. It builds a nest of leaves and plant fragments in holes in trees or other cavities and lays white eggs. Closely allied but with a stouter and broader bill are three species of the genus *Xenicus*, one of which is known as the Rock Wren (*X. gilviventris*) and the other as the Bush Wren (*X. longipes*), both confined to the South Island. The first is three and seven tenths inches long, olive-brown above and pale brown beneath, while the other is dark green tinged with yellow above and dusky below; it is about four inches in length. The Rock Wren, as the name implies, frequents the rocks, especially the loose talus high up on the mountain sides, where it darts in and out among the piles of angular stones, quite after the manner of our own Rock Wren. The claw of the hind toe is greatly developed, even exceeding the length of the toe itself, a modification of structure especially adapted to the peculiar rock-haunting habits of the bird. It has a weak note, but is apparently not much given to using it, and the nest, a neatly made affair, is placed among rocks or in a crevice in a bank; the eggs, from three to five in number, are pure white.

The Bush Wren is a rather rare species seemingly on the decline, and is usually seen singly or in pairs or sometimes several may be associated. It is mainly arboreal although occasionally descending to the ground to search for its food. Usually it is seen running along the trunks and branches of the trees with restless activity, peering into every crevice and searching the bark for small insects; like the Rifleman it has only weak powers of flight. The nest is a very neatly made structure, usually placed under an overhanging clay bank, and is used by the birds in wet or stormy weather, and it is said that when one of the birds is wounded or hurt in any way it immediately flees to its nest. It is mainly silent at all times.

The remaining species, known as the Island Wren (*Traversia lyalli*), was discovered in 1895 on Stephen Island, a small wooded island only about one square mile in extent in Cook Strait. This bird is about the size of and some-

Fig. 179. — Bush Wren, *Xenicus longipes* (upper figure).
Rock Wren, *Xenicus gilviventris* (lower figure).

what resembles the Bush Wren, but is more spotted and mottled and is supposed to be semi-nocturnal in habits; but as a matter of fact very little is known of it, or apparently ever will be, for it is now believed to be extinct, its discovery and extermination having taken place within a year. The first specimen that came into scientific hands was caught by a cat belonging in the family of the lighthouse keeper on this island, and, as a matter of fact, all the specimens known to be in collections appear to have been captured by this feline, which was not only the discoverer but likewise the exterminator of this interesting bird, since no additional examples have been observed.

THE SHARP-BILLS

(Family *Oxyruncidæ*)

Very closely related to the Tyrant-birds (*Tyrannidæ*) are the members of this family, which are included in a single genus and three closely related forms. They agree with the Tyrant-birds in the form of the syringeal muscles, the exaspidean tarsal envelope, and in having the middle toe coherent with the outer toe for less than the whole length of its basal segment, while they differ from them in the sharp-pointed, wedge-shaped bill, and narrow instead of roundish nostrils. The bill is surrounded on lores, front, and under the chin by numerous, small, short bristly feathers, and another character is supposed to be afforded by the serrated outer web of the outer primary, but this is so faint "as to be practically non-existent."

The Sharp-bills are small birds a little over six inches in length, the general coloration above being olive-green with paler wing-edgings, the center of the crown spotted with black and with a median longitudinal patch of narrow, elongated dull scarlet or orange-red feathers, while the lower parts are pale yellowish or whitish, with bars and triangular spots of black; the sexes are alike except that in the female the crest is sometimes not quite so bright. The three forms have usually been regarded as distinct species, but according to Mr. Ridgway, who has recently studied them, they are "apparently mere geographic variations of a single species, which ranges from Costa Rica to southeastern Brazil." Of the habits and life history of the Sharp-bills, we are in almost complete ignorance. Mr. Ridgway secured a single example of the Costa Rican Sharp-bill (*Oxyruncus cristatus frater*), which he found feeding in a tree frequented by Tanagers (*Calospiza*) and for which it was mistaken until it was shot.

THE TYRANT-BIRDS

(Family *Tyrannidæ*)

The Tyrant-birds form a very large group, embracing over eighty genera and nearly six hundred species and subspecies, and are exclusively confined to the New World, spreading in greater or less numbers over all South, Central,

and North America, except the extreme Arctic regions. They are in general birds of small size, few of them exceeding a length of ten inches, and very many falling much below this. In the typical forms the bill is broad, triangular, abruptly decurved, and notched at the tip, and provided along the gape with long bristles, but in other groups of species the bill varies in length and stoutness as well as the degree to which it is provided with bristles. The tarsi are generally short and always exaspidean, that is, enveloped by a series of large scales, which meet near the posterior edge of the inner side, and if separated the space is very narrow and occupied by naked skin or by a row of small scales. The wings are variable in shape, but have the outermost of the ten primaries normal and always more than three fourths the length of the next; the outer primaries are sometimes attenuated near the tip. The tail, which normally consists of twelve, but sometimes of only ten, feathers, is also very variable in shape, ranging from square to graduated and deeply forked.

The Tyrant-birds are mainly insectivorous, performing the same functions in the economy of nature as the Flycatchers of the Old World, but distinguished from them, as well as from other flycatching oscinine birds, by the ten primaries and the peculiar arrangement of the scales of the tarsus, but more especially by the different structure of the organs of voice. As regards coloration, they are for the most part rather dull plumaged birds, of mostly olive hues, frequently relieved by yellow or black, although there are some notable exceptions in which brilliant scarlet plays an important rôle. On the ground of minor structural differences, mostly superficial, as well as supposed divergences in habit and temperament, the Tyrant-birds have been divided into four so-called subfamilies by Dr. Sclater, but these artificial groups are not at all well defined, and the species are often so similar as to be discriminated with great difficulty. The numbers of this family are so great, and their habits so generally uniform for large groups of genera and species, that it will be necessary to select only a few examples for mention or extended treatment.

Tyrants. — In the first of Dr. Sclater's groups (*Tæniopterinæ*), the members of which are mostly confined to South America south of Panama, the colors are mainly black, gray, brown, and white. They have strong ambulatorial feet and spend much time on or near the ground, frequenting especially the open parts of wooded districts, pampas, river sides, and sometimes marshes, but rarely or never the forests. In the typical genus (*Tænioptera*), the nine species of which range principally from southeastern Brazil to Patagonia, the colors are mainly gray or white, relieved with black or gray and often with brownish markings. They are birds of lively disposition, inhabiting the great pampas region, often going in attendance on flocks of Plovers, which they somewhat resemble at a distance. Of the six species found in Argentina, Mr. Hudson says the Pepoaza Tyrant (*T. nengeta*) is one of the most common, "being a swift, active, graceful bird, with strong, straight beak, hooked at the point, and a broad tail four inches long, the total length being nine inches. . . . Their legs are long and they run on the ground like a Chocolate Tyrant, feeding to some extent in the same manner, that is, on the ground, but they also occasionally pursue and capture insects

on the wing, like the typical Tyrant-birds. They have likewise another and unique preying habit. The bird perches itself on an elevation — the summit of a stalk or bush or even of a low tree — to watch like a Flycatcher for its insect prey, only instead of looking about for passing insects it gazes intently downward at the ground, just as a Kingfisher does at the water, and when it spies a beetle or a grasshopper, darts down upon it, not, however, to snatch it up as other Tyrants do, but it first grasps it with the feet, then proceeds to despatch it. Often devouring the insect on the spot, it flies back to its perch to resume the watch." The nesting habits of this species are uncertain, but the closely allied Black-crowned Tyrant (*T. coronata*) is said by the same authority to make a somewhat shallow nest in a bush or large clump of grass, and to lay four white eggs, with large dark spots, chiefly at the larger end.

Cock-tailed Tyrant. — Of the many other forms in this group we may mention the Cock-tailed Tyrant (*Alectrurus tricolor*), a curious little bird, also of the pampas region, having the outer tail feather on each side with a stout shaft and a very broad inner vane, these two feathers being carried vertically and at right angles to the plane of the body, giving the bird the appearance of a diminutive cock, whence its common name. Even more remarkable is the Strange-tailed Tyrant (*A. risorius*), in which the outer tail-feathers on each side make up eight inches in a total length of eleven inches. In these feathers the "vane on the inner side of each is wanting for the first two inches, and then suddenly develops to a width of nearly two inches, which it maintains almost to the tip, when it gradually narrows. The vane on the outer side of the shaft is only about one quarter of an inch wide and is folded so tightly against the shaft as to be quite inconspicuous." During flight, which is described as weak, these enormous feathers are folded beneath the rest of the tail and stretched out behind like a rudder or steering oar, the vanes at right angles to the plane of the other tail-feathers.

The members of the second group (*Platyrhynchinæ*), to the number of about twenty genera and over one hundred species, are forest-haunting birds, almost all of small size and dull olive or gray-colored plumage. Structurally they have much broadened bills and thinner tarsi, the latter to adapt them to an arboreal life. Inhabiting similar places, but differing in having the bill compressed instead of flattened, are the Olive Tyrants (*Elaineinæ*), embracing about the same number of genera as the other group. They are further characterized by weak feet and generally short wings, while the colors are olive-green and dark brown. Both groups inhabit the dense forest regions of Central America and northern South America, very few reaching as far north as Mexico. Not much of interest is recorded regarding their habits, though Dr. Goeldi has recently mentioned the fact that certain members of the latter group, such, for example, as *Myiopatis semifusca*, is guilty of sowing the seeds of *Loranthus*, a mistletoe-like plant which is very destructive to fruit and other trees. We may now well pass to the final group (*Tyranninæ*), which includes the typical Tyrant-birds, among which are most of the largest members of the family. They are also more widely distributed, including most of the North American members of

the family as well as many entering into, or peculiar to, the neotropical region. They have flattened, bristle-armed bills, more or less lengthened and strong wings, and relatively long and robust tarsi, and as befits their increased strength they are almost all vigorous, active, often more or less pugnacious birds, bullying those of their own size and not hesitating to attack birds of the largest size, such as Hawks, Owls, and Crows, in defense of nest or prerogative.

Kingbird, Bee-Martin. — Perhaps the most abundant and conspicuous species inhabiting eastern North America is the Kingbird, Bee-bird, or Bee-Martin (*Tyrannus tyrannus*). About eight and a half inches in length, it is grayish slate-color above, becoming darker on the head and pure white washed with grayish on the breast below, the tail being black, tipped with white, while through the middle of the crown runs a concealed patch of bright orange-red. It is strictly migratory, returning from its winter home in Central and South America in April or early May and remaining until September. It is most frequently seen along roadsides or about orchards, where it usually perches on a dead branch and keeps a constant lookout for passing insects, which it flies out and seizes, returning immediately to its post. It has a fondness for the honey-bee; but as Dr. Coues well says, it probably captures a thousand other insects for every bee it takes, and is deserving of the fullest protection. No particular attempt is made at concealing the nest, which is usually at the extremity of a horizontal branch of an apple or other fruit tree at a height of fifteen or twenty feet from the ground. It is a compact structure made of weed stalks, grasses, etc., and lined with fine grasses, rootlets, and plant down, and the eggs, from three to five in number, are white, handsomely spotted with umber. The notes and calls of the Kingbird are loud and not altogether unmusical, and are uttered with an excess of energy which makes them always attractive. The male takes little or no part in incubating the eggs, but is assiduous in caring for the young, and moreover is always on the watch near the nest for possible enemies, and

> "Woe to the wretch
> In feathered dress who dares invade
> The realm wherein he sways the rod
> And scepter!"

Cuckoos, Blackbirds, Jays, Crows, and even Hawks and Eagles are fearlessly attacked if they venture too close to the cherished home and by repeated darts and spiteful pecks are driven from the neighborhood.

Other Kingbirds. — The Gray Kingbird (*T. dominicensis*) of the South Atlantic States and Greater Antilles may be known by the ash-gray upper parts, absence of a white band on the tip of the tail, larger size, very much larger bill, forked instead of rounded tail, as well as by its very different notes; its habits are similar to those of the Kingbird. In the western United States and extending into Mexico and Central America is a group of species in which the lower parts are yellow and the throat and chest grayish or whitish. Among these the Arkansas or Western Kingbird (*T. verticalis*) is a common summer

visitor to most of the western United States, being especially abundant in the Great Basin region, while Cassin's Kingbird (*T. vociferans*) is more partial to the coast districts.

Phœbe. — Another very common and familiar member of this group is the Phœbe (*Sayornis phœbe*) of eastern North America, a bird olive grayish above, darker on the top of the head, and whitish washed with yellowish below, tinged with brownish gray on the breast; the length is about seven inches. As Mr. Chapman very well says: "There is something familiar, trustful, and homelike in the Phœbe's ways which has won him an undisputed place in our affections. With an assurance born of many welcomes he returns each year to his perch on the bridge-rail, barnyard gate, or piazza, and contentedly sings his humble, monotonous *pewit phœbe, pewit phœbe,* — a hopelessly tuneless performance; but who that has heard it in early spring when the 'pussy willow' seems almost to purr with soft blossoms, will not affirm that Phœbe touches chords dumb to more ambitious songsters!" The Phœbe is not at all pugnacious, but trustful and confiding, and takes up its home near human habitations, placing its bulky, deeply cup-shaped nest of moss and mud, lined with grasses and hairs, on the beam of a barn, under a bridge, or behind a projecting ledge of rock, and there, often in full sight of people constantly passing, it rears its young. In the western United States the place is largely taken by two allied species, — the Black Phœbe (*S. nigricans*), which is slate-black throughout except for the white abdomen, and Say's Phœbe (*S. saya*), in which the abdomen is light cinnamon or tawny.

The **Great-crested Flycatcher** (*Myiarchus crinitus*) of eastern North America may be taken as the typical example of *Myiarchus*, a large genus of some thirty-five species which spreads generally over North, Central, and South America and the West Indian Islands. This species is about nine inches long, dull greenish olive above, the wings and tail brownish, while the sides of the head and neck as well as the throat and upper breast are bluish ashy, and the entire under parts bright sulphur-yellow; the head is provided with a depressed crest, but is without the bright-colored, concealed spot so common in other Tyrant-birds. This bird is partial to open woodland and forests, where its loud, shrill but not especially unmusical call is frequently heard. It is of exceedingly irritable and pugnacious disposition, attacking nearly all the birds of its size with which it comes in contact. The nest, a rather slight affair of grasses, rootlets, etc., is placed in a hole of some sort, usually a hole in a tree, fence rail, or post, and almost invariably has woven into it the cast-off skin of a snake. The object of the snake skin is conjectural, possibly for the purpose of ornament or to frighten away intruders. The eggs are four or five in number and have a cream-colored ground over which is scattered longitudinal lines of rich purple and brown.

American Flycatchers. — Another large genus represented in North America is *Empidonax*, which embraces over thirty forms, all being small birds, under six inches in length, plain brownish, grayish, or olive above, the wings with two lighter bands, and whitish, yellowish, or buff below. They are mostly unob-

trusive woodland birds of quiet ways and gentle manner, building an artistic nest on the ground, or more frequently in the crotch of a bush or low tree. The Yellow-bellied Flycatcher (*E. flaviventris*), Acadian Flycatcher (*E. virescens*), and the Least Flycatcher, or Chebec (*E. minimus*), are examples.

Similar to these, but of larger size and having a relatively longer wing and shorter tarsi, are the members of the genus *Myiochanes* (*Contopus*), of which a dozen or more forms are recognized. The Wood Pewee (*M. virens*) and Olive-sided Flycatcher (*Nuttallornis borealis*) are well-known species of the eastern United States.

Vermilion and Scissor-tailed Flycatchers. — As an example of the bright colors that occasionally occur among the Tyrant-birds we may mention the Vermilion Flycatchers (*Pyrocephalus*), of which some half dozen forms are recognized. They are small birds, from four and a half to five and a half inches long, ranging from the southern United States to Argentina and the Galapagos Islands. In the form reaching the United States (*P. rubineus mexicanus*) the adult male has the whole top of the crested head as well as the entire lower parts a bright scarlet, while the remainder of the upper parts are a brownish gray. The mature female is brownish gray above, and streaked whitish, tinged posteriorly with pale red below. Even more striking is the splendid Scissor-tailed Flycatcher (*Muscivora forficata*), which ranges from eastern Mexico into the southwestern United States as far as Missouri and Kansas, and accidentally much farther. The mature male is light bluish-gray above, tinged with red on the back and white below, washed on sides, flanks, and under tail-coverts with salmon-pink, while the axillaries and a concealed crown spot are scarlet; the long, deeply forked tail is chiefly white; the length is between twelve and fifteen inches, of which seven to ten inches are included in the tail. Of the habits and appearance of the Scissor-tail, McCauley gives the following account, his observations having been made along the Red River of Texas: "This peculiarly beautiful and graceful bird was one of the species most frequently seen. They were especially active in the evening, just before dusk, skimming about in pursuit of insects with wonderful rapidity. As the males fly about the camp with their mates, in the twilight, you can single them out by the greater length of their tails. The two elegant feathery tines cross and open at volition, whence the ordinary simile to a pair of scissors. These birds are grace itself when on wing, darting here and there as quick as thought, in buoyant sweeps and curves. The delicate crimson below their wings, as they go glancing by, glows in contrast with the beautiful hoary ash of their general plumage. . . . In the evening they were particularly shy, avoiding close proximity to the camp; in the early morning, however, they seemed to be less suspicious of our presence. This was very noticeable in going up the Palo Duro, where they would sometimes fly closely by or alight within a dozen yards and poise upon a branch of a small bush, like the Field-lark. They were found frequenting the fringe of timber bordering the streams as far as their headwaters in the Staked Plains."

THE MANAKINS

(Family *Pipridæ*)

The Manakins, or Pipras, have often been placed with the Cotingas, but there seem to be sufficient reasons why they should be kept distinct. They have, for instance, exaspidean tarsi, in which respect they favor the Tyrant birds, while the outer and middle toes are connected for a distance of two joints, or to a greater degree than in the Cotingas. They are for the most part thick set birds of very small size, with rather slender legs and feet, and a short bill, broad at base, but with the upper mandible overhanging and notched behind the tip. In the normal forms the tail is short and squared, while in others the tail, and the wings as well, are subject to very extraordinary modification; a few are crested. In the typical section of the family the sexes are very different in coloration, the males exhibiting very brilliant combinations of blue, scarlet, yellow, or orange with velvety black, chestnut, olive green, or black and white, while in the other section the sexes are alike or nearly so and of dull coloration.

The Manakins are all natives of the New World, being most abundant in Guiana, Venezuela, and Brazil, while a few range as far north as Central America and southern Mexico, and others south to Paraguay and extreme northern Argentina. They inhabit for the most part the dense forests, keeping much to the lower growth of thick bushes, especially along marshes and streams, and usually going about in small parties. In their habits they are said to somewhat resemble our Tits and Chickadees, hopping about the branches in search of their food, which consists very largely of fruits, berries, and seeds, with occasional insects. On account of the peculiar modification of the feathers of the wings, as above alluded to, some species make a very curious and often loud noise. Thus of a common Manakin (*Manacus candei*) of Nicaragua, Dr. Richmond says, "When flying the birds make a buzzing with the wings, and in alighting often make a noise similar to the cracking of a small twig or of a Peccary gnashing its teeth." The nesting habits appear to be various, the nest in some cases being placed on the ground, but for the most part it is suspended from the fork of a branch. A nest of the Lance tailed Manakin (*Chiroxiphia lanceolata*), found by Lieutenant Robinson on Margarita Island, Venezuela, "was suspended in a fork of a stinging nettle, about five feet from the ground, and was so very shallow that I wondered why the eggs were not thrown out by the gentlest breeze. It contained two eggs, one addled and one on the point of hatching. They were large for the size of the bird and resembled the eggs of our Redbird (*Cardinalis*)."

This family numbers about eighty species, disposed as at present accepted among nineteen genera. In *Pipra*, the typical and largest genus (twenty three species), the tail is short and squared and the wings of the males of normal shape; all are small birds, the smallest being only two and eight tenths inches in length, and the largest but four and a half inches long. The males are of exceedingly brilliant coloration. Thus the Aureole Manakin (*P. aureola*) is black above

Fig. 180. — Manakin, *Manacus aurantiacus*.

and below, except the head, neck, throat, and breast, which are bright scarlet; there is also a broad white wing band. The Yellow-collared Manakin (*P. flavicollis*) is similar to the last, but has the throat and neck pure yellow, while the Red-capped Manakin (*P. rubricapilla*) is black, with the head and thighs crimson, and the Blue-capped Manakin (*P. cæruleicapilla*) has the cap and rump blue. Another style of coloration is shown in *P. nattereri*, which is bright green with pure white cap and rump and yellow abdomen, while in *P. opalizens* the cap is a beautiful opalescent blue.

In an allied, brilliantly colored genus (*Machæropterus*) the males have the stems of the secondaries curiously thickened, while in *Chiroxiphia* it is the primaries that have thickened stems. As an example of the former we may mention *M. pyrocephalus*, which is brownish rose-color above, with the wings and sides of the head green, the crown bright yellow, crossed with a central stripe of scarlet, while beneath the color is pale rosy cinereous with darker longitudinal stripes. Of the habits of the Lance-tailed Manakin (*C. lanceolata*) of Margarita Island, Lieutenant Robinson gives the following account: "They were abundant in the heavy forests and usually kept near the watercourses. Their notes had a peculiar and bell-like quality to them, like the lower tones of our Wood Thrush, and it was especially difficult to judge the distance and direction of the singer. At times the notes appeared double, and as I repeatedly saw a pair of males perched on the same branch and almost in contact, they may have been singing together, although in perfect unison." The nest and eggs of this species are described above.

As an example of a form in which the tail departs from the normal the genus *Cirrhopipra* may be selected. In the best-known species (*C. filicauda*) the outer tail-feathers are much lengthened and filiform in shape, the general plumage being velvety black, with the whole head and neck scarlet, with the exception of a yellow front, and the lower parts bright yellow.

THE CHATTERERS

(Family *Cotingidæ*)

Perhaps none of the many curious and beautiful birds that find a home in the New World exceed some of the Chatterers, or Cotingas, in vagaries of ornamentation or brilliancy of plumage. While many of them resemble in size and appearance the members of the family last considered, the limits of size are far greater, since they range from three and a half to some eighteen inches in length, and the variations in feather and other ornamentation are far in excess. Structurally they are distinguished by having non-exaspidean tarsi, in which respect they differ from the Manakins as well as from the Tyrant Flycatchers. In the more typical Cotingas the outer toes are in most cases less united than in the Manakins. The size and shape of the bill varies considerably within the limits of the family, being strong, elongated, and compressed in some and

short and broad in others; in some it is decidedly hooked. The wings in the normal Chatterers contain ten well-formed primaries, but in a small group of genera the second (ninth) primary is much shortened and reduced in size. The tail is for the most part relatively short and squared. In a majority of cases the legs and feet are rather small, as befitting the strictly arboreal life of the birds, while in other groups of genera the feet are stouter and more fitted for terrestrial life. The habits of nidification are various, some building a platform of sticks, others suspending their elaborately constructed nests from the limbs of trees, while still others deposit the eggs in holes in trees. The food of these birds consists very largely of fruits, seeds, berries, and occasional insects.

Thirty genera and nearly one hundred and fifty species of Chatterers are now known, ranging from southern Mexico to northern Argentina, and being perhaps most abundant in Central America, Amazonia, and southeastern Brazil. They are divided by Mr. Sclater and others into some six groups or subfamilies, and while all of these embrace species of more or less interest it will only be possible in the present connection to select a few of the more striking or better-known forms, which must be taken as examples of the rest. Of the members of the first group (*Tityrinæ*) which are distinguished at once by the abnormally reduced second external primary, little need be said beyond the fact that they are plain-colored birds, the sexes usually being very different in coloration. So, also, the members of the second subfamily (*Lipauginæ*) are for the most part dull and unattractive birds, smaller than the last and having broader, very slightly hooked bills. With compressed and very distinctly hooked bills, on which account they have sometimes been placed with the Tyrant-birds, are the members of the third group (*Attilinæ*).

Cocks-of-the-Rock. — This brings us to the confines of the fourth group (*Rupicolinæ*),[1] the typical genus of which embraces the marvelous and beautiful Cocks-of-the-Rock (*Rupicola*). They are large birds for the family, being twelve or thirteen inches long, with rather short but very strong legs and feet, for their habits are terrestrial, and a rather high, compressed bill which is slightly notched at the tip. They have a very large, elevated, and compressed crest which almost conceals the upper mandible, while in the male the wing is curiously modified in that the inner web of the outermost primary is cut away from the tip. The tail is rather short and squared and the feathers of the shoulders and vicinity are more or less soft and plume-like. The sexes are very different in coloration, the males being largely a brilliant orange, orange-yellow, or orange-red throughout, and the females a dull olive-brownish. Of the three species the best-known is *R. rupicola* of Guiana and Amazonia, in which the wings are brown with a broad white transverse bar, the wings and tail being black in *R. peruviana*, which ranges from Venezuela to Bolivia and along upper Amazonia. The third species (*R. sanguinolenta*), which is similar to the last but has the plumage blood-red, occurs in western Ecuador and Colombia.

[1] Ridgway has recently raised this group to full "family" rank (*Rupicolidæ*) on the ground of certain structural details connected with the main artery of the thigh.

Fig. 181. — Opal-capped Manakin, *Pipra opalizens*.

The Cocks-of-the-Rock are found in densely forested places, especially along the headwaters of small streams, where their brilliant plumage makes a fine setting for the otherwise somber surroundings. During the breeding season the males have the habit of congregating in certain suitable localities for the purpose of dancing or showing off before a group of admiring females. But one male performs at a time, hopping upward, swaying the head from side to side and extending the wings and in every way displaying his gorgeous colors to the best advantage. At a signal note he retires from the ring when tired and another immediately takes it up. The nesting habits are no less peculiar,

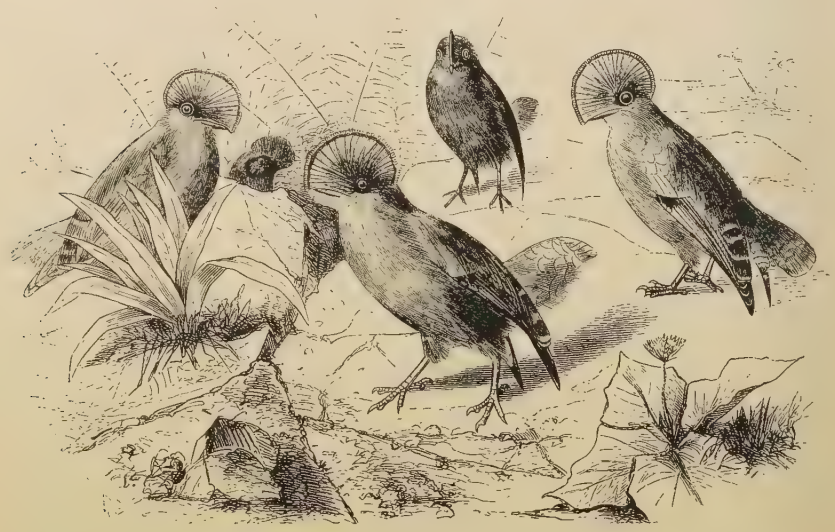


FIG. 182. — Cocks-of-the-Rock, *Rupicola rupicola*.

as described by Mr. T. K. Salmon for the last-mentioned species. Following up a mountain stream until the gorge became more enclosed and more rocky, they came finally to the mouth of a cave overshadowed by high trees and into which the sun never penetrated. "All was wet and dark, and the only sound heard was the rushing of the water over the rocks. We had hardly become accustomed to the gloom when a nest was found, a dark bird stealing away from what appeared to be a lump of mud on the face of the rock. This, upon examination, proved to be a nest of the Cock-of-the-Rock, containing two eggs; it was built upon a projecting piece, the body being made of mud or clay, then a few sticks, and on the top lined with green moss." The eggs were pale buff in color, spotted, chiefly at the large end, with spots of red-brown or lilac. The males and females are rarely seen in company, though often going about in separate flocks.

In the only other genus (*Phœnicocercus*) associated in this subfamily the tarsi

and feet are of moderate size, the crest recumbent, and the shortened wing has the terminal portion of the fourth primary modified into a thickened, horny process; the two brilliantly beautiful species are natives of Guiana, Ecuador, and upper Amazonia. In *P. nigricollis*, a bird eight and a half inches long, the plumage above is velvety black, the wings brown, and the crested crown, rump, and upper tail-coverts, tail, and under parts bright scarlet, relieved on the tail by a broad black tip and on the throat by velvety black. The female is yellowish olive-brown, tinged with reddish and duller scarlet below.

Typical Cotingas. — In the typical Cotingas (*Cotinginæ*), of which there are a dozen genera and about forty species, the plumage vies in brilliancy and beauty with some of the most gorgeous of Old World birds, not excepting the famed Birds-of-Paradise. They are mostly between six and ten inches in length, with slender tarsi and feet and are strictly arboreal in habit. They are natives for the most part of the dense forests of northern South America and Brazil, very few extending into Central America. Of those reaching Costa Rica, mention may be made of the Holy Ghost Bird (*Carpodectes nitidus*), which Dr. Richmond found to be a common species on the Rio Frio. This species is snow-white in color, or with a slight wash of bluish on the back, and has the bill plumbeous and the feet black; the whole length is ten inches. They were found by Richmond to be gorging themselves with fruits from a heavily laden tree near the edge of a forest, and were quite silent at the time.

As examples of the coloration of the true Cotingas we may mention briefly the Blue Cotinga (*Cotinga cærulea*), the male of which is bright ultramarine-blue above and rich reddish purple beneath, the wings and tail being black; the female is brownish black squamated and spotted with buffy. The closely related Banded Cotinga (*C. cincta*) of southeastern Brazil is similar to the last, but has a narrow band of bright blue through the reddish purple of the breast.

Umbrella-birds. — The final group (*Gymnoderinæ*) contains, at least as regards color and ornamental appendages, some of the most remarkable members of the whole family. Among these we may first mention the Umbrella-birds (*Cephalopterus*), of which three species are known. All are provided with a remarkable crest composed of long, slender feathers rising from a contractile skin on the top of the head, and when erected hang as elegant drooping plumes over much of the bill, in fact almost hiding it; the bases of the plumes are white in one species and when the crest is deflected, show as a compact white mass surmounted by the dense, hairy plumes. But this is not all in the way of curious ornamentation. The sides of the neck are naked, but springing from the loose skin of the throat is a cylindrical process of the size of a goose-quill, and two inches or more in length, which in two of the species is covered to its extreme tip with long, loose feathers, thus producing a beautiful cylindrical plume or lappet which reaches an extreme length of thirteen inches in one species, though ordinarily not exceeding six inches. In color these birds are all uniform black throughout, with greenish or metallic reflections on the crest, back, and throat wattle, the females being brownish black, with but slightly developed throat plumes. In the best-known species (*C. ornatus*) the stems of the head

plumes are white, but in the others they are black. This species, which ranges from Guiana and central Brazil through Amazonia to eastern Ecuador and Bolivia, is about eighteen inches long and is described as a shy bird, keeping to the upper branches of the high forest trees, where it seeks its food of fruits. It has a loud, piping note, whence it is called by the native Indians the Fife-bird. The nest, according to Bates and others, is a platform of small branches placed in the top of a tall tree, and the eggs pure white and but four in number. In western Ecuador occurs an allied species (*C. penduliger*) which is but sixteen inches long, yet has the lappet of the extreme length above mentioned. The

Fig. 183. — Umbrella-bird, *Cephalopterus ornatus*.

remaining species (*C. glabricollis*) of Central America from Costa Rica to Panama is of the same length as the last, but has the whole front of the neck and breast bare of feathers, as is the throat wattle. In color the bare skin is reddish orange, that of the base of the naked wattle bright red.

The **Bell-birds** (*Chasmorhynchus*), which take their common appellation from their loud, resonant notes, resembling, it is said, the sound of a clear-ringing bell, or that produced by a blacksmith when he strikes a piece of steel on an anvil, are rather large birds, ten or more inches long, with long, pointed wings and short, strong toes. In color two of the four known species are snow-white and unspotted, that of the others being clear rufous-chestnut with the head and neck pure white, or pure white with the wings black.

The Snow-white Bell-bird (*C. niveus*) of Guiana and Venezuela is distinguished at once by the presence of a slender, erectile, black caruncle at the base of the upper mandible, this being nearly three inches long and sparsely covered

or ornamented with small, white, star-like feathers. In Central America occurs another species (*C. tricarunculatus*) even more remarkable as regards the caruncles than the last, since it possesses three of these long and naked processes,

Fig. 184. — Naked-throated Bell-bird, *Chasmorhynchus nudicollis*.

one arising from the middle of the forehead and the others from the corners of the mouth. In the Naked-throated Bell-bird (*C. nudicollis*), as the name implies, the sides of the head and throat are naked or covered with small scattered bristles; the caruncle is absent. This latter species is confined to southeastern Brazil.

THE PLANT CUTTERS

(Family *Phytotomidæ*)

Having the tarsal covering pycnaspidean as in the typical Cotingas, but differing markedly in possessing a short, conical, finely serrated bill, are the so-called Plant Cutters, which number but four species, referred to a single genus (*Phytotoma*). They are stockily built birds, about seven inches in length, bearing such a strong external resemblance to the Finches that they were formerly placed with them, but the anatomical characters preclude this relationship and show them to be nearest the last-considered family. They have rather short, pointed wings in which there are ten primaries and nine secondaries, and relatively long, even tails of ten feathers.

In habits the Plant Cutters are said to resemble certain Tanagers, going about singly, in pairs, or sometimes in small flocks, frequenting open situations and often causing much damage in gardens and plantations by their propensity for

Fig. 185. — Red-breasted Plant Cutter, *Phytotoma rutila*.

cutting off plants, leaves, buds, and fruits with their sharp, serrated bills. They are quite tame and unsuspicious and are often easily destroyed, and their nests are likewise torn down whenever found in the vicinity of cultivated areas. Their notes are described as being very loud, harsh, and unmusical, in some cases resembling the bleating of a young kid or lamb, and their flight is weak and

not protracted for any great distance. In distribution they are characteristic of the temperate western and southern portions of South America, from western Peru through Chile and Bolivia to Argentina and Patagonia. All feed on fruits, buds, tender shoots, and leaves.

The Red-breasted Plant Cutter (*P. rutila*) of the two last mentioned countries is lead-colored above, the feathers with darker shaft spots, while the wings and tail are black, and the crown, as well as the lower parts, deep brick red; the wings have also a broad white band. This species, Mr. Hudson says, is usually seen singly, but sometimes in small flocks, and is a resident where found. "The male is frequently seen perched on the summit of a bush, and, amidst the dull plumaged species that people the gray thickets of Patagonia, the bright red bosom gives it almost a gay appearance." The nest of this species is made in the interior of a thorny bush and is a slight structure of fine twigs lined with fibers. The eggs are four in number, bluish green with fine brownish spots.

The Chilean Plant Cutter (*P. rara*) is a plainer-colored bird, being brown, streaked with black above and dull rufous beneath, and the wings and tail black, the former with white edgings on the secondaries, and the latter with a dark rufous band on the inner webs of the lateral feathers. It is this species that is particularly destructive; it nests in the tops of high trees.

THE WOOD HEWERS

(Family *Dendrocolaptidæ*)

Under the collective name of Wood Hewers there is aggregated a considerable group of typical neotropical birds numbering about one hundred species, disposed among some twelve genera, which may be taken as representing the Woodpeckers in the mesomyodian series. They are small or medium-sized birds, few exceeding ten inches in length and many falling between six and eight inches, in which the prevailing color is brown in various shades and tints, the tail in a large proportion being a uniform chestnut or ferruginous, while quite uniformly the breast and often the head and back are relieved by buff or whitish spots or shaft streaks. In the form of the tail-feathers the Wood Hewers especially simulate the Woodpeckers, these being stiffened and spiny, and serving to press them against the trunks of trees about which they climb, and thus prevent their slipping downward. The structure of the feet adapts them to the same office as those of the Woodpeckers, though in quite a different manner, for while not zygodactylous, they have the three toes closely bound together for the whole length of the basal phalanx, while the outer toe is nearly as long as the middle one, and considerably longer than the innermost toe; the claws are rather long and sharpened. The bill while usually strong is not especially marked, being as a rule curved and in some forms is extraordinarily long and quite slender. Although they often tap and hammer on the bark or wood, they do not chisel

into the wood for their prey, as do the Woodpeckers, but seek it in the cracks and crevices of the bark, more after the manner of Nuthatches and Creepers.

As additional technical characters it may be mentioned that the *Dendrocolaptidæ* have holorhinal nostrils, the hinder border of the sternum with a

Fig. 186. — Wood Hewers. 1. *Dendrornis lacrymosa;* 2. *Xiphorhynchus pusillus.*

single pair of notches, and the arrangement of the scales on the tarsus of the endaspidean type, that is, have the scales lap round the inner side but deficient on the outside.

"As to the habits of the Wood-Hewers, not much seems to be known, and the little that is on record is of a very general or vague character. They climb up or down the trunks of trees in the manner of true Creepers (*Certhiidæ*), often spirally, and like the Creepers after ascending to the top of one tree-trunk, fly to the base of another, which is ascended in the same fashion. The position in climbing is always upright, as in the case of the Creepers, never inverted as is the habit of Nuthatches. According to Dr. Richmond, the *Dendrocolaptidæ* may nearly always be found among the miscellaneous congregation of birds attracted by processions of the army ant, upon which, together with various insects which they start from their hiding places, they feed with avidity. Their notes are usually harsh, often notably so. They breed usually in holes of trees, after the fashion of Woodpeckers, though a nest of *Glyphorhynchus cuneatus* found by Dr. Richmond was in a small natural cavity at the foot of a tree, not more than ten inches from the ground; it contained two eggs, which were pure white in color." — RIDGWAY.

THE OVEN-BIRDS AND ALLIES

(Family *Furnariidæ*)

The present family, perhaps most typified by the Oven-birds, comprises a very large, exclusively neotropical group of nearly five hundred species of small nondescript birds, which resemble in many respects the members of the last family. This resemblance is so strong, in fact, that it has often been taken as a mark of kinship, and the two groups united under the name of the *Dendrocolaptidæ*, but evidence has been accumulating which tends to prove their distinctness. Thus they differ, apparently universally, in having schizorhinal instead of holorhinal nostrils, while the outer toe is not conspicuously longer than the inner one, and all three anterior toes are coherent for much less than the full length of their basal phalanges, the characters of the feet being such as to permit their separation from the Wood Hewers at a glance.

The Oven-birds (*Furnarius*), so called from the curious nest structures they build, number upward of a dozen species and spread widely over South America from Panama to Argentina. They range in size between five and seven inches and are clad in plumages of clear browns and white, one of the best-known being the Red Oven-bird (*F. rufus*) of Argentina, Uruguay, and Paraguay. This bird, says Mr. Hudson, "is an extremely well-known species in Argentina and where found is a great favorite on account of its familiarity with man, its loud, ringing, cheerful voice, and its wonderful mud nest, which it prefers to build near a human habitation. . . . In favorable seasons the Oven-birds begin building in the autumn, and the work is resumed during the winter, whenever there is a spell of mild, wet weather. Some of their structures are finished early in winter, others not until spring, everything depending on the weather and the condition of the birds. In cold, dry weather, and when food is scarce the birds do not work at all. The site chosen is a stout, horizontal branch, or the top of

a post, and they also frequently build on a cornice or the roof of a house, and sometimes, but rarely, on the ground. The material used is mud, with the addition of horsehair or slender, fibrous rootlets, which make the structure harder and prevent it from cracking. When finished, the structure is shaped outwardly like a baker's oven, only with a deeper and narrower entrance. It is always placed very conspicuously, and with the entrance facing a building, if one be near, or if at a road side, it looks toward the road; the reason for this being, no doubt, that the bird keeps a cautious eye on the movements of people near it while building, and so leaves the nest open and unfinished on that side until the last, and there the entrance is necessarily formed. When the structure has assumed the globular form with only a narrow opening, the wall on one side is curved inward, reaching from the floor to the dome, and at the inner extremity an aperture is left to admit the bird to the interior or second chamber, in which the eggs are laid. A man's hand fits easily into the first or entrance chamber, but cannot be twisted about so as to reach the eggs in the interior cavity, the entrance being so small and high up. The interior is lined with dry, soft grass, and there the pure white, pear-shaped eggs are laid. The oven is a foot or more in diameter, and is sometimes very massive, weighing eight or nine pounds, and so strong that, unless loosened by the swaying of the branch, it often remains unharmed for two or three years. The birds incubate by turns, and when one returns from the feeding grounds, it sings its loud notes, on which the sitting bird rushes forth to join in the joyous chorus, and then flies away, the other taking its place on the eggs. A new oven is built every year, and I have more than once seen a second oven built on top of the first."

Miners. — In a closely allied genus (*Geositta*), the species of which are known as Miners, the birds excavate a burrow, which in the case of the Common Miner (*G. cunicularia*) of Argentina and Uruguay is from three to six feet long, and terminates in a circular chamber, where on a bed of soft grasses the five eggs are deposited. The Earth Creepers (*Upucerthia*) also deposit their eggs in holes in the ground. Another remarkable style of nest is that made by the Firewood Gatherer (*Anumbius acuticaudatus*), so named from the great quantity of sticks it brings together. The site of the nest is usually an isolated tree in an open situation, and the height above the ground varies up to perhaps sixty or seventy feet. "The nest," Mr. Hudson says, "is about two feet in depth, and from ten to twelve inches in diameter, and rests in an oblique position amongst the branches. The entrance is at the top, and a crooked or spiral passageway leads down to the lower extremity, where the breeding chamber is situated; this is lined with wool and soft grass, and five white eggs are laid."

Cachalotes. — Of the second group we may only mention the Cachalotes (*Pseudosizura*), large birds, between nine and ten inches long, with very loud, far-reaching voices and an aggressive disposition. Of the nest of the Brown Cachalote (*P. lophotes*), Mr. Barrows says: "His nest is built entirely of sticks, and many of them of goodly size, frequently as large round as your little finger,

and two feet or more long. These are disposed in such a way as to form a structure three or four feet in length by two in breadth in the widest part, the whole very much resembling a gigantic powder flask lying on its side among the lower branches of a spreading tree. It is quite loosely built, and the nest cavity is rather indefinite, being any portion of the floor of the nest the bird selects for the reception of the eggs. These are usually three or four in number, pure white, and can usually be counted through the loose floor of the nest."

THE ANT-BIRDS

(Family *Formicariidæ*)

Closely related to the last family, but distinguished at once by the taxaspidean instead of endaspidean tarsi, is another great family of neotropical birds known collectively as Ant birds. They are also of small size, being mostly under ten inches in length and mainly confined in their distribution to the hot tropical forests of Central America and northern South America, only very few of the forty genera and nearly three hundred and fifty species reaching as far south as northern Argentina and Uruguay. Many of them are ground- or bush-haunting birds, frequenting the dense tangle of underbrush, through which they run with great facility, and into the mazes of which they plunge on the slightest cause for alarm, while others are found in low or medium-sized trees. The wings are short and rounded, as they enjoy but limited powers of flight, while the tail is of varying length though often short. The tarsi and toes are long and slender, the outer toe being united to the middle one at base, and the claws are of moderate size, while the feathering of the rump is fine and slender, and the interscapular region in the male is, in a majority of cases, marked with a concealed patch of white. The color of the plumage varies considerably, but inclines as a rule to dark brown or black, or black and white.

There are differences of opinion as to their food. Although called Ant-birds, it has been asserted by Belt and other naturalists, who have seen them at home, that they never feed on ants, and when found in attendance on the ant armies so often met with in the tropical forests it is for the purpose of feeding on the insects started up by the advancing hosts and not on the ants themselves. On the other hand, an equally good observer, Dr. C. W. Richmond, who made observations on a number of species in the forests of Nicaragua, states that three or four species of Ant-birds were almost always to be located about an ant army, and appeared to be eating the ants, as examples of the latter were found sticking to the mouths of the birds shot, while Señor Alfaro, director of the National Museum of Costa Rica, states that he has dissected the birds and found their stomachs to contain ants. Furthermore, Dr. Richmond adds that he found the birds as frequently attending the armies that go in solid lines of only five or six inches wide as those covering a width of fifteen or twenty feet. Most species, however, appear not to feed on ants, but on various other insects with occasional seeds. The notes of the Ant-birds are various, sometimes being

a loud, clear, not unmusical whistle, and in others a monotonous chant. Many are said to possess decided ventriloquial powers, throwing their voices so as to deceive as to their position and distance. Comparatively little is known regarding their nesting habits.

FIG. 187. — Ant-Thrushes, *Grallaria dives* (upper figure). *Grallaria perspicillata* (lower figure).

Bush-birds. — The Ant-birds are divided into three not very sharply defined groups, among them the so-called Ant-Shrikes (*Thamnophilinæ*), which include the largest and most widely distributed representatives of the family. In these birds the bill is large, deep, and compressed, and terminates in a strongly hooked and toothed tip, very much as in the bill of a Shrike, on which account, and

before their structure was known, they were placed by the older systematists among the *Laniidæ*. The sexes are quite different in coloration, the males being varied with white and black and the females with brown. They are not usually strictly terrestrial in habit, but frequent dense bushes and trees at no great distance from the ground, on which account they are also called Bush-birds. Of the typical and largest genus (*Thamnophilus*) we may mention the Red-capped Bush bird (*T. rufipapillus*) of Paraguay and Argentina, a bird about six inches long, olive-brown tinged with rufous above and grayish white below, the lower throat and abdomen being barred transversely with black. This species, Mr. Hudson says, is a shy, solitary bird, found in woods and thickets along streams; its only language is an occasional low, rasping note. The nest is a slight shallow structure placed in a low tree, and the eggs are white thinly spotted with reddish brown. Another species (*T. cærulescens*) was found in lower Uruguay by Barrows, who observed them in the densest clumps and most tangled masses of swampy vines and shrubs. A nest found by him was almost precisely like that of the Red-eyed Vireo, "being pensile in the fork of a horizontal spray, only four feet from the ground. It contained three fresh eggs, white, with spots and dashes of light brown." Of still another species (*T. melanocrissus*), noted by Dr. Richmond in Nicaragua, we learn that it is "found in thickets bordering the forest, in patches of brush in clearings, in clumps of bamboo along the banks of streams, and in similar places. It is often seen on the ground in these situations, searching for insect food."

The **Ant-Wrens** (*Formicariinæ*), so called from their superficial resemblance to the true Wrens, are comprised in the second of the poorly defined groups, being smaller and more delicately formed than those last noticed, and having more slender, less-hooked bills. As an example of this group, mention may be made of *Formicarius umbrosus*, a species found by Richmond along the Escondido River in Nicaragua. It is brown above, darker on the head and brighter on the rump, paler beneath, and black on the throat; the length is about seven inches. "Its lonely call may be heard in the woods at all times. It passes its entire time upon the ground in the more retired parts of the forest, using its wings only when suddenly surprised. If one falls in with a bird while traveling through the woods, it sneaks quietly away without resorting to flight, unless a suspicious movement is made."

The members of the final group are known as Ant-Thrushes, and may be recognized by their elongated tarsi, large feet, and short tails. The sexes are nearly alike in coloration, and in a way they may be said to take the place of the Old World Pittas.

THE ANT-PIPITS

(Family *Conopophagidæ*)

This small and relatively unimportant family comprises but two genera and sixteen species, all natives of tropical South America. In some respects, as in the depressed bills and scutellation of the tarsus, they appear to be related to

the Tyrant-birds, with which they have been sometimes classed, but in the structure of the syrinx they indicate their agreement with the Ant-birds, but from which they, together with the next family, may be distinguished at once by the four-notched sternum. They are small birds, none of them exceeding five and a half inches in length, with relatively short, rounded wings and typically very short tails, while the rump is clothed with long, lax feathers. In the typical genus (*Conopophaga*) the prevailing color is brown above and ashy brown or grayish banded with chestnut beneath, the throat either being black, gray, or white, and in several of the species there is a stripe or pencil of white feathers behind the eyes. In the other genus (*Corythopis*) the bill and tail are longer and the hind claw slenderer but less curved. The plumage is olive-brown above and white beneath, with a breast patch and stripes of black. Very little is known of the habits of any member of the family.

THE TAPACOLAS

(Family *Pteroptochidæ*)

The final family of the superfamily *Clamatores* is a small one, embracing eight genera and about thirty species of mostly small, Wren-like birds, ranging in distribution from Costa Rica to Patagonia, being perhaps most abundant in Chile and Patagonia, but occurring also in the Andes of Peru, Ecuador, and Colombia, where they reach elevations of nine or ten thousand feet. They are terrestrial birds mainly of skulking habits, frequenting the dense thickets and jungles and rarely taking to wing. In coloration they are largely dusky brownish or blackish, with one exception, in which the plumage is ocellated. They have short, rounded wings and mainly rather short tails which are carried in an elevated position, while the feet are exceptionally stout and the claws, especially the hind one, often very long. In the scutellation of the tarsus they agree with the Ant-birds, but in the four-notched sternum they fall next the preceding family. The bills of these birds are very peculiar in that the space between the external nostrils (mesorhinum) is greatly modified, in some cases being rounded and elongated and in others expanded into an oval shield; the nostrils are often covered by a membrane. In shape the bills may be either thin and awl-shaped or strong and thick.

In the largest genus (*Scytalopus*), which contains more than half of the species, the bill is awl-shaped and the tail very short, as are the plumes about the lores. The plumage is various, being largely plumbeous or blackish brown, occasionally dark or ashy gray.

In the typical genus (*Pteroptochus*) the bill is straight and has the operculum-covered nostrils opening by a narrow slit at its base. Of the two species, the White-necked Tapacola (*P. albicollis*) occurs in western Argentina and central and northern Chile, sometimes frequenting watercourses, when it may be observed running about on the stones much like a Dipper. In coloration it is

chestnut-brown above, with the lores, a stripe over the eye and the under parts white, the breast and abdomen being more or less thickly marked with transverse spots of brownish black; its length is eight and a half inches. Darwin found it extremely common in central Chile, where he says it "frequents hedge-rows and bushes which are scattered at a considerable elevation over the sterile hills, where scarcely another bird can exist. The Tapacola is very crafty; when frightened by any person, it will remain motionless at the bottom of a bush, and will then, after a little while, try with much address to crawl away on the opposite side. It is also an active bird and continually making a noise; these noises are various and strangely odd: one is like the cooing of Doves, another like

Fig. 188. — Large-footed Tapacola, *Hylactes megapodius*.

the bubbling of water, and many defy all similes." He was told, but did not himself observe it, that the Tapacola builds its nest at the bottom of a deep burrow.

Allied to the last but differing in the shorter, more curved bill are the two species of *Rhinocrypta*, of which the form inhabiting western Argentina and northern Patagonia is known as the Gallito or Little Cock (*R. lanceolata*). About nine inches in length, it is olive-brown above, becoming reddish brown on the head and neck, while the throat and upper breast are gray, becoming pure white on the middle of the abdomen and bright chestnut on the sides. The head is conspicuously crested, and as the bird struts and runs about on the ground with the tail erect and the crest elevated, it looks very much like a small domestic fowl, whence of course its common name. Mr. Hudson speaks of it as a very common bird on the Rio Negro, frequenting thickets and making a great protest with loud, scolding notes, but keeping itself carefully concealed. "At the same time," he adds, "it is extremely inquisitive, and no sooner does it spy an intruder in the bush than the warning note is sounded, whereupon every

bird within hearing hops up into a thick thorn bush. When approached they all scuttle away, masked by the bushes, with amazing swiftness, to take refuge at a distance, when the loud protest is again resumed; but when the pursuer gives up the pursuit in disgust and turns away, they immediately follow him, so that he is perpetually encircled with the same ring of angry sound, moving with him, coming no nearer, and never allowing its cause to be seen." These birds build a round, dome-shaped nest entirely of fine, dry grass, which is placed in the center of a thorny bush only two or three feet from the ground. The entrance is on one side, and the eggs are usually four in number and pure white.

Our illustration is that of an allied species (*Hylactes megapodius*) of central and northern Chile.

THE FALSE SONG BIRDS

(Superfamily *Pseudoscines*)

This is an especially inappropriate and misleading designation for the members of this group, for they possess musical ability of no mean order and greatly superior to that of many of the so-called true Song Birds. They are confined entirely to Australia and embrace but two families, the first of which includes

THE LYRE-BIRDS

(Family *Menuridæ*)

Gould, the celebrated author of the "Birds of Australia," states that if called upon to select an emblem for Australia from among the birds, he would without hesitation designate the Lyre-bird as the most appropriate, and it could hardly be denied that the choice would be a wise one, for of the many interesting avian forms peculiar to the island continent perhaps none is more eminently characteristic or generally attractive. Three species are known, all belonging to the genus *Menura* and all confined to South Australia. They are large birds, about two and a half or three feet long, with a rather long neck and large head, the bill being elongated, conical, and sharp-pointed. The wings are rather short and rounded and contain twenty-one quills, while the legs and feet are very strong, with long and nearly straight claws. In the female and immature male the tail, although long, presents no very peculiar features, but in the adult male of two of the species it has an extraordinary development and shape. It consists of sixteen feathers, the two outer feathers being first slightly curved outward, then inward, and again outward abruptly near the tips, thus producing a lyre-like form, and further each of these feathers has the outer web very narrow and the inner web very broad. The inner pair of feathers is nearly as peculiar, being without a web on the outside and with a very narrow one on the inside, while they cross each other near the base and bend forward near the tips. The remaining tail-feathers are beset with long, flowing, hair-like barbs about a fourth of an inch apart, these being without barbules. In the other species, known as Prince Albert's Lyre-bird (*M. alberti*), the tail is very different, not

being lyriform, in fact has the outer feathers shorter than the others. The plumage of all is sooty brown above and brownish ash-color below, with more or less rufous on the chin, wings, and throat.

The systematic position of the Lyre-bird has been much discussed. It was first regarded as a Pheasant, later as a Bird-of-Paradise, and finally has come to

Fig. 189. — Common Lyre-bird, *Menura superba*.

be considered as without any very close affinities, although in some respects showing characters intermediate between the Woodpeckers and the other passerine groups. The first and best-known species is the Lyre-bird *par excellence* (*M. superba*) of New South Wales and southern Queensland. It is found alike in the "scrub" along the coast and along the mountain sides in the interior, usually being exceedingly shy at all times and under all conditions. On this point Gould says: "While among the brushes I have been surrounded by these birds, pouring forth their loud and liquid calls, for days together, without being able to get a sight of them, this being rendered the more difficult by their often frequenting the most inaccessible and precipitous sides of gullies and ravines, covered with tangled masses of creepers and umbrageous trees; the cracking of a stick, the rolling down of a small stone, or any other noise, however slight,

is sufficient to alarm them." They are solitary in their habits, rarely more than a pair being seen together, and are constantly wandering through the brush. Among the many curious habits is that of forming small round hillocks, which are constantly visited during the day and upon which the male is continually trampling, at the same time erecting and spreading out his tail in the most graceful manner. When alarmed they run through the bush with the greatest rapidity, carrying the tail horizontally. The male is a singer of no mean attainments, having a variety of calls and notes of his own, as well as being an expert imitator of the notes of other birds and even the howling of the Dingo. The early morning and evening are the periods when they are most animated and active. The nest, which is artfully concealed, is placed on the ledge of a projecting rock, on the top of a stump, or the base of a tree. It is of large size, formed outwardly of large sticks and lined with the inner bark of trees and fibrous roots, and is more or less completely roofed over. The single egg is large and very dark colored, appearing as though smeared with ink. The young bird, which is clothed with down for a month, remains in the nest for six weeks or more. In the vicinity of Melbourne the place is taken by the very closely allied Victoria Lyre-bird (*M. victoriæ*), or Bullan-Bullan, as it is called by the natives, in indication of its gurgling note. Its habits are very similar to those of the first-mentioned form.

Prince Albert's Lyre-bird, however, is not only considerably different in plumage — lacking the lyriform tail — but has somewhat different habits. Thus instead of the mounds each bird forms three or four "*corroborying places*," as the wood sawyers call them, consisting of holes scratched in the sandy ground, being about two and a half feet in diameter by sixteen, eighteen, or twenty inches, and three or four hundred yards apart. When approached cautiously the bird may be seen at one or the other of these holes, into which it frequently jumps and seems to be feeding and then ascends and struts round and round the place, imitating with its powerful musical voice any bird it may chance to hear about it. It is recorded that one which had taken up its quarters within two hundred yards of a sawyer's home soon learned to imitate all the sounds of the household, such as the crowing of the cocks, the cackling of the hens, the barking and howling of the dogs, and the painful screeching of the sharpening or filing of the saw. Its own whistle is said to be exceedingly beautiful and varied. Recently a Mr. M'Neilly, of Drouin, Australia, has described a Lyre-bird which he has had in a state of domestication about his farm for a period of twenty years. It was a male, and he attained the full perfection of plumage in six or seven years, becoming a great favorite about the place. "There appears to be nothing he could not mimic. The following are a few of his favorite imitations: the noise of a horse and dray moving slowly, with the play of the wheels in the axle boxes, chains rattling, etc.; an occasional 'Gee up, Bess'; the sound of a violin, piano, cornet, cross-cut saw, etc. All the more frequent noises heard about the farm the bird learnt to perfection, such as a pig being killed, dog howling, child crying, flock of Parrots, jackass laughing, and many other imitations of calls of small birds."

THE SCRUB-BIRDS

(Family *Atrichornithidæ*)

Apparently quite closely related to the Lyre-birds are two curious, not to say anomalous, little birds of the dense Australian scrubs or brush wood forests, known appropriately as Scrub-birds (*Atrichornis*). Aside from their diminutive size as compared with their larger relatives, being only between seven and nine inches long,—they differ structurally in possessing rudimentary furcula, a sternum with a single very deep, instead of a slight, lateral indentation, and tail-feathers of normal shape and ordinary texture. They have a relatively large bill and very strong legs and feet, while the wings are exceedingly diminutive, and the tail long, broad, and somewhat graduated. In coloration the plumage is plain, being dark chocolate or rufous brown above, barred and waved with blackish. Although these birds seem to be tolerably common in certain localities, and the males are not infrequently taken, it appears that the females are unknown to science, and it is only within the past eight or ten years that the nests and eggs have been detected.

The larger of the two species known as the Noisy Scrub-bird (*A. clamosa*), occurs in the western and southwestern parts of Australia, and is further distinguished by having the throat and breast white, with a patch of blackish on the lower throat and fore neck. It frequents the dense, almost impenetrable thickets of undergrowth in scattered pairs or individuals, and is so exceedingly shy that one may spend days in its midst without so much as catching a glimpse of it. It takes its vernacular name from its very peculiar loud note, which Mr. Campbell says is "a kind of sharp whistle repeated eight or nine times rapidly, with *crescendo*, concluding in a sharp crack that makes the woods resound." The first and apparently only nest yet discovered was found by Mr. A. T. Hassell near Albany, in October, 1897, and was a dome-shaped structure, placed on the ground and composed of grass and rootlets with a few leaves, and lined with a white, downy substance; the two eggs were reddish white with purplish brown markings.

The Rufous Scrub-bird (*A. rufescens*), which is separated from the other by its small size and orange-rufous under parts, is found in the Richmond and Clarence districts of New South Wales, where, like its relative, it occurs among logs and fallen trees overgrown with weeds, vines, nettles, etc., and is exceedingly shy. It is a great mimic as well as an accomplished ventriloquist, imitating the notes of a dozen other birds until it is impossible to tell what its own notes are. "I have frequently stood on a log," says Dr. Ramsay, "waiting for it to show itself from among the tangled mass of vines and weeds at my feet, when, all of a sudden, it would begin to squeak and imitate first one bird and then another, now throwing its voice over my head, then on one side, and then apparently from the log on which I was standing. This it will continue to do for hours together, and you may remain all day without catching sight of it." The nest of this bird was not found until 1898, and proved to be dome-shaped, with

an entrance on the side, like that of the larger species, the two eggs which it contained being pinkish white, with a cluster of reddish brown spots at the apex and scattered spots of the same over the surface.

THE SONG BIRDS

(Superfamily *Oscines*)

"It is unfortunate," says Mr. Ridgway, "that no better vernacular name for this group of passerine birds has been invented or seems available. The term is certainly both inappropriate and misleading, since by no means all *Oscines* are songsters (some of them, in fact, being almost voiceless), while the *Pseudoscines* and many of the *Clamatores* are as much gifted with musical ability as the average oscinine songster." However, as the term has been long in use, and is not likely to be supplanted by another of even as general applicability, it may be accepted with the limitations implied above. As here defined, the *Oscines* embrace no less than forty-nine so-called "families," although but few of them can be considered as very trenchant groups. With such a multiplicity of forms to deal with, it is absolutely necessary that some division should be made, else the consideration would be involved in a hopeless tangle.

THE LARKS

(Family *Alaudidæ*)

The first of the so-called "families" of singing birds happens to be very well founded, for it not only includes within its limits singers of a high order of musical ability, but it is rather sharply and clearly distinguishable from all the others, — a condition, it will be noted, which does not by any means obtain in even a majority of the remaining "families." Although the Larks have at least a superficial resemblance to a number of other forms, especially the Pipits, being small, brownish and streaked, ground-haunting birds, they are known at once by the structure of the tarsi, which are blunt behind instead of sharp, as in all other oscinine birds. Their tarsi are also scutellated behind, except occasionally in very old birds, the plates corresponding nearly in position and number with those in front. As this form of the tarsus is generally regarded as a generalized feature, the Larks are usually placed at the bottom of the series, but as Dr. Stejneger has hinted, it may be in the light of our present knowledge a specialized feature, in which case they should perhaps be placed at the top, a position, indeed, which has sometimes been assigned them. In addition to the above characters the Larks have long, pointed wings in which there are normally ten primaries, though the outer is often very short or practically obsolete, lengthened inner secondaries, moderately long tails of twelve feathers,

and usually an elongated hind claw. The bill is variable in shape, but has the edges of both mandibles smooth, except for a notch in the upper one. The head is often crested or furnished with erectile tufts or horns. They are generally sociable, and, when not breeding, often gregarious birds, frequenting principally open plains, cultivated areas, or arid deserts, walking and running with ease and celerity on the ground and rarely alighting on trees. To "sing like a Lark" has become a proverb, and it is well founded, for the celebrated European Skylark, which belongs here, may be taken as the typical musical member of the family; the song is usually given while the birds are soaring in the air. Some of the Larks are migratory, while others are stationary or only very partially migratory. They are especially developed in the Palearctic area, being abundant in Europe, central Asia, and the more open parts of Africa, only a portion of one genus being indigenous to America. As might be presumed, they all nest on the ground, constructing usually a very slight structure of grasses in a hollow or under a tuft of grass.

Horned Larks. — The only native representatives of the family in the New World are the Horned Larks (*Otocoris*), which are easily distinguished by the short, stout, somewhat conoid bill, and a narrow, elongated tuft or "horn" of feathers springing from each side of the head, while in coloration they are mixed brown, rufous, cinnamon, pinkish, yellowish, white, and black. Occurring over practically the whole of North America and Mexico, the Horned Larks are also found throughout most of Europe and Asia, as well as northern Africa, the twenty or more American forms all being regarded as geographic races of a single species (*O. alpestris*), at least two forms of which are present in the Old World as well. With the possible exception of the Song Sparrows (*Melospiza*) there are no other North American birds having such a plastic constitution as these, and as a result some of the forms appear to intergrade with several — sometimes as many as five — others, and curiously enough it is not always contiguous races that are most closely related. This condition is perhaps largely accounted for by the fact that, being largely graminivorous, they are mainly stationary, only the more northern forms migrating and these somewhat erratically. Their adaptability to climatic and physiographic conditions is very great, since they "are found from the shores of the Arctic Ocean to the heart of the tropics; from the level of the sea to the summits of lofty mountains; and from regions of excessive rainfall to the most arid deserts. They are preëminently birds of the open country, rarely if ever venturing into the depths of the forests, for the grassy savannas, cultivated fields, country roadsides, the bare or bushy deserts, and the stony slopes of mountains are habitats much more to their taste." — Oberholser.

These pretty little birds are usually seen in small, scattered parties, though in winter they may congregate in larger flocks, often in company with other species, such as Snowflakes, Longspurs, etc. They run along the ground in front of a pedestrian, but if pressed too closely, rise with a sharp whistled note and after circling around alight usually at no great distance and resume their feeding. During the breeding season they have a very pretty though short song,

which is usually uttered while, with tail expanded, the bird is soaring in the air, but it is also given while they are perched on a low stone or clod of earth. They begin nesting early in the season, often while there is still snow on the ground, usually choosing the benches of the prairies or higher ground, where they place the slight nest of dried grasses in a shallow depression by the side of a tuft of grass, a stone, or other object. Both parents take part in incubation and are very solicitous for eggs and young, often trying to lead an intruder away. The eggs are usually three or four in number and are olive-buff thickly specked and spotted with brownish and dark lavender. Two and sometimes three broods are reared in a season by certain of the forms.

Without attempting to distinguish between the obscurer forms, it may be mentioned that the common Horned Lark of North America (*O. alpestris*) is of large size, being between seven and a half and eight inches in length, and has the upper parts dark, the throat and eyebrow sulphur-yellow, and a large patch of yellow on the side of the head and upper breast. This bird is found in summer in Newfoundland, Labrador, and the Hudson Bay region, coming south in winter into the eastern United States. Considerably smaller than this, and with the nape, rump, and bend of the wing more pinkish, is the Old World form (*O. a. flava*) which summers in the extreme northern part of Norway and Sweden, northern Russia, and Siberia, while in winter it visits the British Isles and central and southern Europe. The other commonest American forms are the Pallid-horned Lark (*O. a. leucolæma*) and the Prairie Horned Lark (*O. a. praticola*).

Skylarks. — Turning now to the Old World for the remainder of this family, we may well commence our account with its most celebrated members, the Skylarks (*Alauda*), of which there are several species and probably many subspecies. They have a rather short though slender bill, the nostrils covered by plumelets, rather long, pointed wings in which there are ten primaries, the outer being minute, a moderately long, slightly forked tail, and a very long, nearly straight hind claw. In coloration the plumage is dark brown above, each feather broadly edged with fulvous and pale fulvous and whitish beneath, the cheeks and throat slightly and the breast broadly streaked with black; their length approximates seven inches. The best-known species, and the one about which centers so much of classic prose and poetry, is the Skylark *par excellence* (*A. arvensis*), a common and familiar bird throughout much of Europe and Asia. It is found in open places, such as pastures, commons, downs, and mountain slopes, but more especially in cultivated areas, having greatly increased in numbers and range with the spread of agricultural improvement; in fact, we are told that it is probably the most abundant bird in western Europe. From early spring until midsummer they are spread here and there throughout this vast area engaged in rearing their young, of which there are usually several broods, but by September they commence to congregate in flocks, often of enormous numbers, and to range about the country in search of food. In the more northern portions of their habitat they appear to be entirely migratory, departing for the south on the advent of severe weather; but in Great Britain and the

Continent they are not wholly so, for while the majority are absent in the coldest weather, many, evidently northern birds, may be found in various situations. During these fall migrations the birds often come, as on the east coast of Scotland and England, in a continuous stream for several days at a time until the numbers are simply incalculable. At such times they are snared and netted by thousands and even hundreds of thousands for food, a massacre of the innocents that would seem to threaten them with extermination, though Mr. Newton charitably extenuates the slaughter by pointing out that if not thus held in check, many would die of starvation or be lost at sea while seeking new fields, for the food supply could not hold out for such vast hordes. The nest is the usual slight structure of straws and grass in a grain field or meadow. At this time the birds are quite fearless, allowing a near approach before taking flight, and depending much upon the protective coloration for concealment. Their eggs, usually three to five in number, are grayish white marked with brown, drab, and lavender. The food of the Skylark consists principally of the seeds of grain and wild plants, and in summer such insects as they can readily procure in cultivated fields.

Fig. 190. — Skylark, *Alauda arvensis*.

In spring and summer, and to a limited extent at other seasons, the Skylark makes its presence known by its delightful "heart-lifting" song, which is usually uttered while the bird is soaring and circling high in the air, but also after it has alighted on the ground. The notes are protracted and cheerful, with a peculiarly liquid sound, surpassing in strength and sweetness that of all other birds with which they associate except, perhaps, the Nightingale. The Skylark is a favorite cage bird, since it endures confinement well, and sings freely and delightfully for a good part of the year. When reared from the nest, they become gentle and affectionate, acquiring the song of any birds they are associated with, but if taken when adult they often pine. So celebrated has this bird become on account of its song that many attempts have been made to introduce it into other parts of the world, but, perhaps fortunately, not always with success. In the neighborhood of Melbourne, Australia, and in New Zealand it has become firmly established, but the attempt made some fifteen years ago to naturalize it on Long Island appears not to have succeeded well, though it has been recently reported as abundant in the vicinity of Brooklyn, New York. It is, no doubt, better that this "meddling activity" with nature should fail, since if it once gained a firm foothold it might sweep over the country as its confrere, the House Sparrow, has done, though it would be found in fields and open places instead of towns and cities.

The other species, if we accept but two as many incline to do, is the Indian Skylark (*A. gulgula*) of India and Ceylon. It is so exactly similar in coloration

to the last that a separate description is not needed, the only essential difference being its constantly smaller size. Its habits and song are also practically indistinguishable.

Wood Lark. — Very similar to the Skylarks and formerly included with them is the Wood Lark (*Lullula arborea*) of Europe and western Asia. The sole tenant of its genus, it is simply a "lesser Skylark, with a shorter tail in proportion to its body, and no apparent difference in color, except that the spots on the breast and the pale streak over the eye are more conspicuous." It also frequents much the same situations, being, however, partial to sandy localities and heaths, as well as wooded parks, the edges of woods and grassy fields, where the trees and hedges are scattered about. It is a lively but rather shy bird, and notwithstanding its name spends by far the larger portion of its time on the ground, where it exclusively secures its food of seeds and insects. It does, however, perch on trees and bushes, often having a favorite perch which it frequents day after day while the young are being reared. It not infrequently sings from a perch, or from it launches into the air to ascend in spirals to a considerable height, giving forth a continuous stream of melody. Its song is so similar to that of the Skylark that it is often mistaken for that bird, but it is perhaps not so powerful, though sweeter and more flute-like in quality. It is nowhere so abundant as the Skylark, in many parts of its range, as for instance in the British Isles, being very locally distributed; nor is it so migratory, as it only moves slightly to the southward. In winter they collect in small parties during the severe weather, but on the advent of mild days these flocks break up and re-form on the return of cold. The Wood Lark nests on the ground, placing its frail structure in a slight hollow by the side of a bush or tussock of grass. The four or five eggs are whitish with numerous spots of reddish brown. It is sometimes kept as a cage bird, though not so generally as its relative.

Crested Larks. — Resembling the members of the last two genera in habits, and to a large extent in appearance, are the Crested Larks (*Ptilocorys*), which are distinguished from them at once by the larger and stronger bill, and the presence of a conspicuous crest composed of a few feathers springing from the middle of the crown. The few, perhaps half a dozen, species, range from central and southern Europe to northern Africa, and eastward to central Asia, India, and China, the best-known being the common Crested Lark (*P. cristata*). A resident or a partially migratory species according to locality, it is a common bird in many parts of continental Europe, but is only a rare straggler to the British Isles. While traveling about, especially in spring, it is often seen in flocks and is rather wild, but in its summer home it is one of the most confiding and fearless of birds. Thus Mr. Dresser states that "when in southern Germany and Hungary, where it is very common, I observed it on almost all the highroads and in the streets of the small towns and villages, pecking amongst the horse droppings almost as tamely as a London Sparrow. They appear very fond of inhabited places and frequent highroads, seldom being found very far from these, and when disturbed by a passing vehicle will either run on one side and let it pass or fly on, again and again, as the traveler approaches them."

The call note of this species, according to the same author, is "a soft, low whistle, and its song, which is generally uttered whilst the bird is on the wing, but sometimes also when it is sitting on the ground, is clear, sweet, and well modulated." The nesting habits are similar to those of the groups already described, though the nests are oftener near human habitations. The Crested Lark is a favorite cage bird in certain parts of its range, notably in Germany and India, in the latter country being frequently kept in a dark cage or one about which a cloth is wrapped; it has a very sweet song in captivity.

Sometimes included with the last, but usually separated on the basis of their possessing a shorter, stouter bill, are a number of Crested Larks (*Spizalauda*) which inhabit the Indian peninsula. They are resident birds where found, the best-known being perhaps Syke's Crested Lark (*S. deva*).

Desert Lark. — The largest member of the group appears to be the Desert Lark (*Alæmon desertorum*), which attains a length of from eight and a half to eleven inches, the female being much the smaller. The genus, which includes several other species, is known by the long, slender, gently curved bill, fully exposed nostrils, and short wings in which the outer primary is small though exceeding the primary coverts, while the toes and claws are very short and the latter very stout; the sexes are alike in plumage. The above-mentioned species, which ranges widely over the deserts of northern Africa, and thence through Persia and Afghanistan to western India, is isabelline-gray above, the chin and throat white, the fore neck and breast pale fulvous spotted with black, and the remainder of the lower parts white. The middle pair of tail-feathers are bright fulvous and the others black with fulvous margins, except the outer pair, which are white-margined, while the primaries are black with white bases. This grayish or ashy plumage, it will be observed, harmonizes well with the sandy wastes wherein it makes its home. It is said to run over the sand with great speed, quite resembling a small Plover, while the male during the breeding season utters his short, unpretentious song while circling in the air. In India the Desert Lark breeds in May or June, making a small, grass-lined nest on the sand and depositing usually three eggs, which are grayish white, marked with yellowish brown.

Calandra Larks. — In some ways recalling the Horned Larks is a genus of large, heavily built birds known as the Calandra Larks (*Melanocorypha*), but they lack the hornlets on the side of the head and have rather thicker bills. Of the half a dozen or more species the best-known is the true Calandra Lark (*M. calandra*) of central and southern Europe and southwestern Asia, which is looked upon as one of the sweetest singers of the many among which it dwells. It is a wild and wary, quite Finch-like, bird, frequenting cultivated and barren lands in both hills and plains, the male, according to Mathew, springing from the ground "and with a graceful, undulating motion describes a series of large circles until he rises to an immense height," giving forth the while his clear, rich, and melodious song. So pleasing is the song that in southern Europe, notably in Portugal, it is a favorite cage bird, and it is also esteemed as an article of food. In the nesting season they occur only in pairs, but as cold

weather comes on they congregate in small parties and may be observed frequently dusting in the sand. Their nest is of the usual type of grasses and plant stems placed in a slight depression on the ground.

Closely allied but larger and darker plumaged is the Long-billed Calandra Lark (*M. maxima*) of the higher portions of Sikhim and Tibet, where it frequents marshy meadows, collecting in winter in large flocks. Also similar to the first, but lacking the white tips to the secondaries and the white on the tail-feathers, is the Eastern Calandra Lark (*M. bimaculata*). It occurs in northeastern Africa, Persia, and central Asia, being a winter visitor to many portions of India. Its habits and loud, sweet song are similar to those of its near relative. Quite distinct, however, is the Black Lark (*M. yeltoniensis*) of the desert steppes of central Asia, the male being jet-black throughout, the upper parts with a few sandy margined feathers, while the female is pale sandy brown above and white below, the throat and breast spotted, and the flanks streaked with brownish. During summer they are spread in pairs over this inhospitable area engaged in rearing their young, but on its completion they gather in large flocks and wander about, frequenting especially the brackish districts, and with severe weather they appear in southern Russia, and are there often observed on highroads and near houses. The call note of this species is low and piping, while its song is said to bear some resemblance to that of the Skylark, though it is not so powerful.

The **Short-toed Larks** (*Calandrella*), so called from the fact that the hind toe with its claw is very short, are inhabitants of sandy and barren open places, and have much the appearance and habits of the Horned Larks. They are, however, of small size and have a short, deep bill and long wings in which there are but nine obvious primaries, while the tertiaries are greatly lengthened. The common species (*C. brachydactyla*) is a well-known bird in central and southern Europe, and it also occurs in North Africa and in Asia as far east as Lake Baikal, many passing the winter in India. It is a tame and confiding bird, affecting sandy plains in summer, but in winter it congregates in large flocks and ranges far and wide. Its food consists largely of seeds. Its song, Mr. Dresser says, "is short and not of a high quality, and is uttered either when the bird is on the wing or when perched on a clod or stone." The coloration of the Short-toed Lark is sandy brown streaked with blackish brown above and white beneath, the breast washed with buff and bordered by two patches of blackish brown; the quills are blackish brown, the outer web of the first one edged with creamy white, and the tail is similar to the wings, but has the outer feathers tipped and margined with buffy or white.

Other Species. — There are other members of the family, such as the Finch Larks (*Ammomanes*), so named from the thick, Finch-like bill, the Bush Larks (*Mirafra*), which frequent well-wooded districts and commonly perch on bushes and low trees, and the Sand Larks (*Alaudula*), which make their home especially along the sandy banks of rivers, but as they do not greatly differ, either in plumage or habits from those already described, we may close our account of the group.

THE WAGTAILS AND PIPITS

(Family *Motacillidæ*)

The family *Motacillidæ*, comprising the Wagtails and Pipits, is a small one, embracing less than one hundred forms of mostly plain plumaged birds, of almost world-wide distribution. Certain of them — more especially the Pipits — have a strong, albeit superficial resemblance to the Larks (*Alaudidæ*), but they are distinguished from them at once by the different form and scutellation of the tarsus. They are insectivorous birds of eminently terrestrial habits, walking or running on the ground in a graceful, "mincing" manner instead of hopping, and frequenting mostly open places, such as prairies, fields, deserts, banks of rivers and ponds, and sometimes marshes, though a few, as the true Pipits, seek their food on the ground amidst thin underbrush, occasionally hopping into the lower branches when alarmed. They have slender conoid bills which are always shorter than the head and slightly notched subterminally, long slender tarsi, and slender toes, the claw of the hind toe (hallux) being usually elongated and equal to or even exceeding the digit in length. Their wings are rather long and pointed, the outermost four or five of the nine primaries being longest, while the innermost secondaries are greatly elongated, often equaling and sometimes exceeding the longest primaries; the tail is variable in length, but is never much shorter, and is sometimes longer, than the wing, being longest in the Wagtails.

The **Typical Wagtails** (*Motacilla*), which range widely throughout the Old World with the exception of Australia and Polynesia (two species are accidental or occasional in Greenland and Alaska, respectively), are usually pied, black, gray, and white in plumage, though some are partially bright yellow; all are conspicuously devoid of streaks, spots, or mottlings. The sexes are nearly or quite alike, though there are often striking differences between the summer and winter plumage. As might be presumed, they take their common name from their habit of vibrating the body and tail, which they do constantly. The Pied Wagtail (*M. lugubris*) of Great Britain and western Europe frequents gardens and meadows, and, according to Mr. Hudson's delightful account, is one of the creatures that seem never to be in the same mind for two moments in succession. "He runs, then stands, and shakes his tail, for two or three moments he searches for food; then chases an insect, and is still again, waiting for a new impulse to move him: suddenly he flies away, not straight as if with an object in view, but with a curving, dipping, erratic flight, governed seemingly by no will, and just as suddenly alighting again, when he is once more seen standing still and shaking his tail. The call note, a sharp chirp of two syllables, is emitted once or twice during flight. The song is a loud, hurried warble, uttered on the wing as the bird hovers at a moderate height from the ground. But the Pied Wagtail has another way of singing, especially in early spring: this is a warble so low that at a distance of fifteen yards it is but just audible, and is uttered continuously for two or three minutes at a stretch." The nesting operations commence in April or early May; the nest, which is composed of grasses, moss, fine roots, etc.,

and lined with wool, feathers, or hair, being placed in a hole in a bank or rock, or in an old wall or stone heap; the four or five eggs are bluish white spotted with grayish brown. In summer the plumage of this species is variegated with black and white, the back, shoulders, chin, throat, and neck being black, while in winter the back and scapulars are grayish ash, and the chin and throat white, the latter with gorget of black; the length is about seven and a half inches. Closely allied is the Japanese Pied Wagtail (*M. lugens*) of eastern Siberia, Kamchatka, and Japan, the White-faced Wagtail (*M. leucopsis*) of eastern Siberia, the Himalayas, and China, and the White Wagtail (*M. alba*) of Europe generally, north to Ireland and occasionally Greenland, which may be known by the gray upper parts and white forehead, sides of head, neck, and abdomen.

European Yellow Wagtail. — As an example of the group in which there is more or less of yellow in the plumage we may select the common Yellow Wagtail (*M. rayii*) of western Europe, in which the upper parts are olive-green, while a stripe over the eye and the under parts are a rich sulphur-yellow; it is smaller than many of the others, being only about six inches long. It is a common bird in Great Britain, where, as Seebohm says, "its active, sylph-like movements and its delicate form and lovely plumage make it a general favorite." It does not come about houses, but is found in open downs, pastures, and grassland, as well as in fields where crops are being sown, or where it may follow the plow; it also frequents places where cattle are being pastured to feed upon the insects startled from the grass by the animals. The nest, placed on the ground, is usually well concealed amidst grass and herbage, and the four to six eggs are white, mottled with pale brown and olive. Another well-known species belonging to this group is the Yellow-bellied Wagtail (*M. flaviventris*) of Madagascar, which has the entire abdomen yellow, this being separated by a broad black crescent from the white breast.

The **Forest Wagtail** (*Limonidromus* or *Dendronanthus indicus*), the only representative of its genus, has the two middle tail-feathers much shorter than the others, and the whole upper plumage suffused with olive-green; it summers in eastern Siberia and North China, and winters in India, Ceylon, and the large islands to the south. It is found running about on the ground in well-wooded districts and when disturbed perches on the lower branches, but otherwise its habits do not differ from those of the other Wagtails.

Pipits. — The Pipits are distinguished at once from the Wagtails by their relatively much shorter tails and streaked upper plumage, the prevailing colors being brownish or tawny. The sexes are alike in coloration, but the seasonal differences, so pronounced in the Wagtails, are very slight in the Pipits, though during the breeding season the plumage often becomes worn and faded. The typical Pipits (*Anthus*), of which there are a large number, are practically cosmopolitan, being absent only from the Papuan Islands and Polynesia, and are the only members of the family normally occurring in the New World. Of the three native species, the best-known is the American Pipit, or Titlark (*A. pensilvanicus*), which is found extensively dispersed over the whole of North America, breeding in the higher Rocky Mountains and in sub-Arctic districts, and spending

Fig. 191. — Yellow-bellied Wagtail, *Motacilla flaviventris*.

the winter in the Gulf States, Mexico, and Central America. To the bird-lover in almost every portion of the United States they are familiar birds, as they pass through in the late fall and on the return journey in early spring. They frequent open places especially near the seacoasts, but pastures, old fields, recently burned or plowed fields in the interior are almost sure to harbor them. At this season they are thoroughly gregarious, going in small or large flocks and spending their entire time on the ground or on the wing. When feeding they are often somewhat scattered, but on a common signal they all rise together with a soft, querulous cry — *dee-dee, dee-dee* — and either fly away to a great distance or as often settle within a few yards of where they rose. Their nests, of which there are often several in the immediate neighborhood, are placed on the ground under tufts of grass in meadows or marshes, and are made of grass and moss; the four to six eggs are grayish in color, heavily spotted and blotched with brown.

Sprague's Pipit. — Very distinctively American is Sprague's Pipit, or the Missouri Skylark (*A. spragueii*), a common bird of the interior plains, where it breeds abundantly as far north as the Saskatchewan district, and in winter retires to the table-lands of Mexico. Of its habits and marvelous song, I can do no better than quote from Dr. Coues: "The ordinary straight forward flight of the bird is performed with a regular rising and falling, like that of the Titlark; but its course, when startled from the ground, is exceedingly rapid and wayward; at such times, after the first alarm, they are wont to hover around in a desultory manner for a considerable time, and then pitch suddenly down to the ground, often near where they rose. Under such circumstances they have a lisping, querulous note. But the common traits have nothing to do with the wonderful soaring action and the inimitable, matchless song of the birds during the breeding season. Rising from the nest, or from its grassy bed, this plain-looking little bird, clad in the simplest of colors and making but a speck in the boundless expanse, mounts straight up, on tremulous wings, till lost to view in the blue ether, and sends back to earth a song of gladness that seems to come from the sky itself. No other bird-music heard in our land compares with the wonderful strains of this songster; there is something not of earth in the melody, coming from above, yet from no visible source. The notes are simply indescribable; their volume and penetration are truly wonderful; they are neither loud nor strong, yet the whole air seems filled with the tender strains, and the delightful melody continues unbroken. The song is only heard for a brief period in the summer, and is only uttered while the birds are soaring." Their nests are placed on the ground under an upturned sod or in a tussock of grass, and are composed of fine grasses; their three or four eggs are similar to those of the Titlark though slightly larger.

Old World Pipits. — The twenty or more Old World Pipits are all very much alike in plumage and to a large extent their habits are similar, though there are some differences in the nature of the localities chosen by the various species. Thus the Meadow Pipit, or European Titlark (*A. pratensis*), and its near relative, the Water Pipit (*A. japonicus*), is found in situations similar to those frequented by our species, that is, in open fields and meadows, and, like our Sprague's Pipit,

FIG. 192. — Water Pipit, *Anthus japonicus*.

it has the habit of singing while it soars, though it appears that the song is not quite so strong or varied. The Tree Pipits (*A. trivialis* and others) are found more in woods, groves, and gardens in preference to open situations, and often perch on trees, while the Rock Pipit (*A. obscurus*) frequents rocky coasts, neither its song nor nest occurring outside the sound of the ocean.

THE FORK-TAILS

(Family *Enicuridæ*)

The systematic position of this small group, which comprises only three genera and a dozen species, has long been a matter of uncertainty. They have often been placed near or among the Wagtails (*Motacillidæ*), which they certainly much resemble in appearance and habits; other writers, notably Dr. Sharpe, have regarded them as an aberrant group of the Babbling Thrushes (*Timeliidæ*), but later they have been placed by him among the true Thrushes (*Turdidæ*), while Dr. Stejneger has recorded his suspicion that they are not oscinine birds at all, but may ultimately find a resting place in the neighborhood of the Pittas. This confusion can only be resolved by a careful anatomical examination, pending which they are accorded family rank and placed tentatively next the *Timeliidæ*.

The Fork-tails are trim, dainty birds, between six and eleven inches long, with stout, straight, usually rather long bills, long and strong legs, and moderately rounded wings in which there are ten primaries, the outer (tenth) being long and well developed, while in the typical forms the tail is very long and deeply forked, though in Scouler's Fork-tail (*Microcichla scouleri*) the tail is much shorter and nearly square; in several the head is provided with a short crest. The coloration is mainly black and white, — in two species the hind neck and back are rufous, while another has the crown dull chocolate, — the disposition of which is often in the form of spots or bars, though in several the rump and under parts are pure white, as are the outer pair of tail-feathers.

In distribution the Fork-tails range throughout the Himalayas to western China and down the Malay Peninsula to Java, Sumatra, Borneo, and the Philippines. They are generally shy, wary birds, avoiding the vicinity of human habitations and frequenting the rocky beds of mountain torrents, where they are seen running along with alacrity or hopping from stone to stone, moving the tail incessantly, and picking up their food of mullusks, worms, and insects in or near the water. The Bornean Fork-tail (*Enicurus borneensis*), a species recently discovered on Mount Kina-Balu, at elevations of one to three thousand feet, seems to prefer the deep gorges where little or no sunlight enters. According to Mr. Whitehead, "it is very shy, flying out of shot, or more often out of sight into the forests which border the stream. The note is a pleasant whistle, which is always uttered when the bird is alarmed, before taking flight. I have often seen three or four flying after each other up these dark gorges, and the tail seems more like a streamer, waving up and down with every motion of the bird."

The nests of the Fork tails, which are large for the size of the bird, are placed on the ground under an overhanging bank, in a niche among the rocks, or occasionally on tree stumps, and are concealed by overhanging ferns and other vegetation. They are composed of grass, moss, rootlets, etc., and lined with finer rootlets, hair, and dead leaves; the four or five greenish white eggs are sparsely spotted with reddish brown.

THE BABBLING THRUSHES

(Family *Timeliidæ*)

Of all the "families" of *Oscines* perhaps none is more difficult of intelligible definition, or generally unsatisfactory, than the present. It appears to have been instituted as a sort of "catch-all" for the reception of certain groups that did not fit well into the current systems, with the result that it was at first made to include many forms that have since been referred to the true Thrushes (*Turdidæ*), Wrens (*Troglodytidæ*), Bulbuls (*Pycnonotidæ*), Birds-of-Paradise (*Paradiseidæ*), Bower Birds (*Ptilonorhynchidæ*), etc., but it still embraces a goodly number. As our knowledge of the structure of these forms increases, a point on which information is still woefully inadequate, it is more than likely that further eliminations will be made until perhaps nothing is left, or it is restricted to a logical basis. In the meantime, however, the "family" may be accepted with the frank confession that it is neither adequate nor satisfactory.

As the supposed diagnostic characters are at present understood, the *Timeliidæ* form a large group of mainly tropical Old World birds of various sizes in which the bill is decidedly Thrush-like, the wings short, rounded, and concave so as to fit close to the sides of the body, and the whole plumage generally lax and soft. The outer of the ten primaries is comparatively large, and the plumage of the nestling is like that of the adult female, though paler, both being unspotted.

A number of subfamilies have been recognized within the *Timeliidæ*, but as there is not agreement as to the number or their limitation, we may ignore these lines and select for description a few trenchant groups of genera, beginning with a half dozen known collectively as the Laughing Thrushes. They are non-migratory, large birds, mostly between nine and twelve inches in length, with the head more or less distinctly crested, and very strong legs and feet, while the wings are rounded and weak. Most strongly developed in the Himalayas and India, they range southward over the Indian peninsula and large islands adjacent, and westward into Africa. According to Oates, "all are without exception gregarious, being found in troops of from six to twelve individuals. They feed principally on the ground, their strong feet and bills enabling them to turn over leaves, and they are also found on trees, on which they take refuge when disturbed. On being alarmed, or frequently without any apparent cause, they break out into a chorus of notes resembling laughter or loud chatter. They

are also in the habit of going through various amusing performances on the ground, erecting their crests, drooping their wings and expanding their tails, dancing and capering about all the time. They are all found in forests or amongst trees and bushes, and although cautious and sometimes very shy, yet on some occasions they seem careless of observation, and they are difficult to get rid of when once their curiosity has been excited. They eat almost every sort of insect and smaller reptile, and they no doubt partake also of fruit. They construct large, cup-shaped nests in trees and lay eggs which with few exceptions are spotless white or blue." The genera included within this group are *Dryonastes*, *Garrulax*, *Ianthocincla*, *Stactocichla*, *Grammatoptila*, and *Trochalopteron*.

Chinese Nightingale. — One of the best-known members of the group is *Trochalopteron canorum*, of China and Hainan, which is the Hoa-méy of the Chinese and the so-called Chinese Nightingale of European residents. About eight and one half inches in length, it is dark rufescent or deep olivaceous brown above, the head and hind neck being streaked, with dark shaft lines to the feathers, while the quills are sepia-brown and the tail-feathers olive-brown indistinctly barred with dusky; the forehead appears scaly from the presence of black shaft streaks to the feathers, while the sides of the neck, throat, and under parts are tawny buff, the feathers mainly with the black shaft streaks. The bird is fairly abundant in the mountains of the middle provinces of China, where it frequents especially the borders of woods in small parties. It is very commonly kept in captivity by the Chinese, who regard it very highly as a songster, though its sonorous and varied notes are rather too loud for the full enjoyment of Europeans. It becomes very tame and familiar when caged, but in a state of nature it is extremely wild. It is also employed in combat by the Chinese.

Coachwhip Bird. — We should not omit the Coachwhip Bird (*Psophodes crepitans*) of Australia, which has gained for itself this curious designation on account of the resemblance of the notes of the male to the sound of a whip-lash. "Starting with a limpid, long-drawn sound closely resembling the noise produced by the whirling of a whip-lash preparatory to its being swished through the air to terminate in the sharp crack so well known, the male bird gradually merges his voice into the swish of the lash, ending in a loud, sharp, crack-like note. The volume of sound is so great that it can often be heard a quarter of a mile away." — MATTINGLEY. The call of the male is usually answered by the female with a softer, two-note call, which is so different that they are not usually supposed to be made by the same species.

The Coachwhip Bird, which finds its home in the dense scrubs of the mountain sides in Victoria and New South Wales, is a handsome crested species about ten inches in length, greenish black above and blackish below, the cheeks and sides of the throat white, and the center of the breast and of the abdomen mottled with white, as are the outermost tail-feathers. It builds a neat, circular nest of grasses and rootlets, only a few feet from the ground, in dense scrub, and lays two handsome white or greenish white eggs which are mottled and blotched with brown.

True Babblers. — The true Babblers (*Argya*), comprising upward of twenty

species, are spread over the plains of India and Burma and thence westward through Afghanistan, Persia, and Palestine, well into Africa. About the same size at the last, they are mainly brown-plumaged birds, going about in small flocks and keeping to the ground or near it, and are very noisy when disturbed. They build similar, cup-shaped nests, generally placing them in high grass, and lay unspotted blue eggs. The Common Babbler (*A. caudata*) is found in small flocks in every portion of India proper, frequenting all sorts of country, including gardens, and appears to breed throughout the greater part of the year. About nine inches long, it has the whole upper plumage brown tinged with fulvous, each feather with a dark brown shaft streak, the tail olive-brown, cross-rayed, while the chin and throat are fulvous and the lower parts paler with faint striations on the breast and sides; the bill is brown with a yellow base, and the iris, legs, and feet are yellow.

Pied Babbler. — Another even larger genus of Babblers is *Crateropus*, inhabiting the whole of Africa below the Sahara as well as the Indian peninsula and Ceylon, and differing from the last chiefly in possessing a shorter tail and stouter bill. The Pied Babbler (*C. bicolor*) of the interior of Africa is a striking bird, being white throughout with the exception of the wings, tail, bill, and legs, which are black. According to Mr. Ayres, they go in flocks from tree to tree or bush to bush with feeble flight, following each other almost in single file. They are found usually among low bushes on the dry plains, and when one commences its peculiar sort of clucking note, it is followed by the others, the noise increasing until it is almost deafening. They build a compact, deep, circular nest of twigs and grasses in a low bush, laying usually three greenish blue eggs.

Scimitar Babblers. — Presumably belonging here is another considerable group known as the Scimitar Babblers, from the long, very slender, and compressed decurved bill, which is as long as, and frequently much longer than, the head. They have much the same habits as the Laughing Thrushes, being sociable birds, going about in the same noisy companies, though their notes are rather more pleasant. They construct their nests on or very near the ground and lay white unspotted eggs. The principal genus (*Pomatorhinus*) comprises upward of thirty species and extends throughout the Himalayas and mountains of China, Formosa, and Hainan, down the Malay Peninsula to Java, Sumatra, and Borneo and even to New Guinea and Australia, from which latter country we may select one for more extended mention. The Babbler, or Chatterer (*P. temporalis*), as it is there called, is quite generally spread over the eastern half of Australia, frequenting bushes and open forests, where it is often to be seen on the ground, but on the slightest alarm takes to the trees. It is gregarious and exceedingly noisy and garrulous, being constantly on the move. Commencing with the branches nearest the ground it gradually ascends in a series of hops to the very tops of the tree, whence with elevated tail it peers down and continually utters its peculiar chattering cry. "These birds," says Mr. Lau, "perform their business — feeding, nest building, sleeping — together. The nest is a large, dome-shaped edifice, and with so many helping hands, or rather bills, is constructed in a day or two; I have myself observed every bird in a flock

having a dry stick carrying it to the same nest. In this way three or four snug houses are built, one of them serving as a dormitory wherein the whole company take their night's rest, save those busy incubating during the nesting season. The formidable nest with hole inside possesses a cozy interior made up of dry grass rootlets and fur from different animals. Its site is about ten feet from the ground, either in a little tree or in the hanging branches of a eucalypt." The size of this curious structure is about twelve inches in outside, and five or six inches in inside, diameter, with entrance about two inches across. The eggs, usually four or five or occasionally more, are buff, clouded with purplish or brownish gray, and covered with curious interlacing hair lines of brown. In coloration this species is dark or blackish brown, with the throat, center of the breast, and a broad superciliary stripe of white; its length is ten inches, of which the finely pointed bill takes up one and three eighths inches and the tail four and a half inches.

The Slender-billed Scimitar Babbler (*Xiphorhamphus superciliaris*) of India, the only member of its genus, is remarkable chiefly for its extremely slender, much-curved bill, which is nearly two and one half inches long, the total length of the bird being only nine inches. It constructs its large, globular nest of leaves and grass on the ground or in dense bushes, and lays white eggs.

Typical Babblers. — The remaining forms that we shall have space to mention belong mainly to what are presumed to be the typical members of the family, namely, the subfamily *Timeliinæ*. They are in general much smaller birds than those already mentioned, and, according to Mr. Oates, agree in being solitary in their habits, or rather less gregarious, though some of them are said to go about in small flocks, but this is by no means a general or usual character among them. They are above all things skulkers, frequenting the ground or undergrowth, and being seldom found many feet above the ground. They are not remarkably noisy, and they simply evade observation to the best of their power. All of the members of the group, or at least the Indian representatives so far as known, appear to lay spotted eggs. They have the same strong legs and feet and short, rounded wings of the Laughing Thrushes and their allies, but the head is never fully crested; the sexes are invariably alike in coloration, the principal hue being some shade of brown, often relieved with slight dashes of white, yellow, or black.

Red-capped Babbler. — The genus *Timelia*, which is the basis of the group name, is a small one embracing only two or three species, the best-known being the Red-capped Babbler (*T. pileata*) of the plains and lower hills of India, Siam, and Cochin China, whence it extends down the Malay Peninsula to Java. It is between six and seven inches long and has the upper plumage olive-brown with a cap of deep rufous, and the forehead with an eye stripe of white, while the throat and chin are white, and the breast white indistinctly lined with black. It is a cheerful, active little bird, creeping about amongst grass near the ground and deposits usually three eggs, which are white speckled with brown.

Golden-headed Babbler. — As most of the forms allied to the above species are similar in appearance and habits, being separated mostly on minor technical

characters, we may well pass them by, to take up briefly a small group in which the plumage is a little more attractive. Thus the Golden headed Babbler (*Stachyris chrysæa*) of India, a bird but five and a half inches long, has the upper plumage and wings bright olive-yellow, the forehead, crown, and nape bright golden yellow, the lores black, and the entire lower plumage bright yellow. This species, in common with the others of its genus, frequents bushes and low trees, among the leaves and flowers of which they seek their insect food.

Fig. 193. — Red-capped Babbler, *Timelia pileata*.

Their oval nest is constructed usually of bamboo leaves and fixed between some upright branchlets near the ground. This happens to be the only Indian genus which lays unspotted white eggs.

Tit-Babblers. — Another group of small birds having the strong feet and short, blunt bills of the Tits are appropriately known as Tit-Babblers, but otherwise in structure and habits they agree with the other members of the subfamily. Lack of space prevents considering these more fully, and also the many others regarded, rightfully or not, as belonging to the *Timeliidæ*, though perhaps we should not omit the curious little **Fern-bird** (*Bowdleria punctatus*) of New Zealand. About seven inches in length, the general color above is a dusky fulvous brown, while the lower parts are white spotted and streaked with blackish, and there is a narrow white streak over the eye. The Fern-bird, "Utic," or

Swamp Wren, is a very shy bird found in dense swamps and tangles along lagoons, where it is more often heard than seen, though its monotonous call is sure to attract attention. A sight of the bird is usually momentary and generally occurs in a chance manner, as it flies with feeble flight and depressed tail for a few feet in a direct line and low, as it drops with a scramble into the fern of its own color. It builds a deeply cup-shaped nest in the midst of a tussock of grass and lays three or four dull white, closely spotted eggs.

THE BULBULS

(Family *Pycnonotidæ*)

The Bulbuls, or Fruit Thrushes, constitute a large and fairly well circumscribed group of birds, often included among the Babbling Thrushes (*Timeliidæ*), but differing from them, among other characters, in having relatively short tarsi and as a rule numerous and strong rictal bristles. Another character which seems to distinguish them is the presence of a greater or less number of "hairs" springing from the nape, these being frequently very long, but sometimes short and inconspicuous, though never, according to Mr. Oates, entirely absent. Their wings are normally short and rounded, but in some forms they are quite long and pointed, and in a few the secondaries are more or less elongated, while the tail is various, being commonly rounded, but sometimes it is square or graduated and rarely forked. In a few forms the tail-coverts nearly equal the rectrices in length, and a majority of them have the rump plumage long and fluffy; crests are of frequent occurrence. "The sexes are ordinarily alike in color, and the young closely resemble the adult, the brighter colors being replaced for the first few weeks by paler tints of the same." Most of them approximate eight or nine inches in length, while in coloration they are extremely variable, the usual hues being olive-brown, olive-green, or olive-yellow, but some are entirely black, others a beautiful turquoise, cobalt, or purple-blue, varied with crimson, scarlet, orange, yellow, rufous, etc.

The Bulbuls are for the most part gregarious and sociable birds of arboreal habits, frequenting gardens, orchards, bushy jungles, and forests, and while some of them may have rather harsh chattering or croaking notes, the majority possess a very melodious and cheerful song, which renders them familiar and welcome neighbors. Thus the Madras Bulbul (*Molpastes fuscus*), a fearless and very sprightly bird, often locates itself in close proximity to houses, not infrequently building its nest in verandas, where it becomes a universal favorite, and from its exceedingly sweet song is known as the Ceylon Nightingale. The food of these birds consists mainly of fruits, berries, and seeds, varied occasionally with insects, which are secured among the leaves and branches of trees, as they rarely, some of them never, visit the ground; their nests and eggs are variable, as will be shown under the few species selected for mention.

White-throated Bulbuls. — The *Pycnonotidæ* have their center of distribution in southeastern Asia, whence they extend to Java, Sumatra, Borneo, and

the Philippines; but they are by no means unrepresented in the Ethiopian region, which possesses exclusively half a dozen or more of the thirty-five or forty genera and nearly a hundred of the two hundred and fifty species. In the large genus *Criniger* (which, by the way, has been recently subdivided), or the White-throated Bulbuls, the head is ornamented by a long, pointed crest and a number of very long "hairs" which spring from the nape, while the plumage is very soft and fluffy. One of the best-known is the Himalayan White-throated Bulbul (*C. flaveolus*) of the eastern Himalayas, which has the upper parts olive-green, the crest olive-brown, each feather being edged with olive-green, the throat and chin white, and the under parts bright yellow. They are sociable birds, frequenting the forests in flocks of six to a dozen, and are very noisy, their notes being harsh and constantly repeated.

One of the most remarkable members of the group is the Hairy-backed Bulbul (*Tricholestes criniger*) of Tenasserim, the Malay Peninsula, and large islands to the southward, which is known by the numerous long hairs which spring from the back; it is mainly olive-green above with brownish wings and yellow under parts. It is a very tame bird, frequenting brushwood in small parties and subsisting mainly on insects. Passing over the so-called Black Bulbuls (*Hypsipetes*), which have the plumage gray or dark brown, the bill red, and the tail slightly forked, and the nearly related Brown-eared Bulbuls (*Hemixus*), all of which are noisy birds found mainly in the forests, we come to the large genus *Molpastes*, the members of which are remarkable for bright color of the under tail-coverts. Of these the "Ceylon Nightingale," or Madras Bulbul (*M. fuscus*), already mentioned, is one of the best known, being equally abundant throughout nearly the whole of India; it is mainly brown in coloration, with most of the feathers edged with white, though the head is deep black, the abdomen and upper tail-coverts white, and the under tail-coverts crimson. According to Oates, "it breeds from February to August, constructing a flimsy but pretty nest of dry leaves and grass in bushes, creepers, or the lower branches of trees," and lays usually three eggs, which are pale pink marked with reddish brown and gray.

Typical Bulbuls. — In the typical genus (*Pycnonotus*), or the one which is the basis of the family name, the thirty or more forms are divided between eastern Asia and Africa, and may be known by the generally smaller size and practically crestless head. Although there are a few of brilliant coloration, the majority are rather dull, — brown, black, or olive-green upper parts and white or yellow lower parts being the more frequent colors. They are in general less sociable than many of those already mentioned, and are very arboreal, it being a rare occurrence to observe them on the ground. One of the commoner birds of the Malayan region is the Yellow-vented Bulbul (*P. analis*), which Mr. Whitehead found very abundant in Labuan. He says: "These Bulbuls are seen toward evening in swarms going through the mango trees, where they roost in large flocks; at this time they are very noisy. They are common enough in Kina-Balu at low elevations, and I have seen a Dusauan boy go out of an evening and catch three or four with his 'gutta' stick." The nest of this species

is a cup-shaped affair constructed of twigs and dry leaves and placed in a low bush; the eggs are pinkish marked with maroon and purple. Of quite different appearance is the Blue-bellied Bulbul (*P.* or *Rubigula cyaniventris*) of the Malay Peninsula and Sumatra, the upper parts being bright yellowish green, the head and under parts deep slaty blue, and the lower tail-coverts bright yellow. Perhaps the best-known of the African forms is the Red-browed Bulbul (*P. capensis*) of South Africa, which in coloration is brown with the center of the abdomen whitish and the lower tail-coverts bright yellow, the distinguishing character being "a dark red wattled eyelid." "The 'Kuif-Kop,' as it is called by the colonists," Dr. Sharpe says, "is found in great abundance in the neighborhood of Cape Town and indeed throughout the whole colony. They migrate according to the fruit season and are especially partial to figs and grapes. They also feed largely on the berries of the Persian lilac, and when that tree is in fruit any number might be shot by a person lying in ambush. When feeding they keep up a continual chattering, and as they usually go in flocks of ten or fifteen in number, their presence is soon detected." Very similar to this, but known by having the eyelid black and not wattled, is the Black-browed Bulbul (*P. tricolor*) of Southwest Africa. Regarding this species, Mr. Thomas Ayres writes as follows: "These birds live entirely on fruits and berries, and are very destructive in our gardens, devouring indiscriminately bananas, loquats, peaches, papaws, Cape gooseberries, and also other soft fruits. They are very numerous; they build generally in the fork of a tree, toward the top, and lay from three to five eggs. These birds often get intoxicated by eating fruit that is over-ripe and has undergone fermentation, more especially the Cape gooseberries, and when in this drunken state are easily caught, as they can fly but a few yards at a time, and then not straight, soon tumbling to the ground."

Green Bulbuls. —The handsomest members of the family are the Green Bulbuls (*Chloropsis*) of southern and southeastern Asia, which have the plumage mainly bright green, set off with jet-black, blue, or orange and yellow. Thus the Golden-headed Green Bulbul (*C. aurifrons*) has the plumage a dark grass-green with the front of the head rich orange-yellow, the chin, cheeks, and upper throat bright blue, the sides of the head and lower throat black, while there is a collar of yellow and the shoulders and smaller wing-coverts of verdigris-blue. This species, and in fact all of its relatives, are rather solitary birds, going about in pairs or singly and frequenting trees, among the leaves of which they secure their food, which consists mainly of insects. According to Mr. Oates, they mimic the calls of other birds, and, notwithstanding their brilliant plumage, are difficult to detect among the leaves. The common Green Bulbul (*C. jerdoni*) of the Indian peninsula and Ceylon differs from the above species in having the forehead dull yellow and the upper parts light grass-green. According to Jerdon this species is usually met with in pairs, flitting about the extreme branches of trees, examining the leaves for insects. It has an agreeable call note, and builds a slight cup-shaped nest of fine grasses near the extremity of a branch; the eggs are white with a few claret blotches.

THE FLYCATCHERS

(Family *Muscicapidæ*)

The Flycatchers constitute a very large group of small, exclusively Old World birds, which should not be confounded with the so called American Flycatchers (*Tyrannidæ*), although their habits are somewhat similar, since the latter are not even oscinine birds at all. Altogether the Flycatchers do not form a very sharply circumscribed group, which is perhaps hardly to be wondered at in one so large and varied, and it is possible to trace their affinities in several directions. Thus in the mottled plumage of the nestling they show an approach to the Thrushes (*Turdidæ*), yet from these they are distinguished by the weak tarsi and feet, which quite incapacitate them for walking on the ground. Certain of the genera also evince a likeness to the Babbling Thrushes (*Timeliidæ*), others to the Wood-Shrikes (*Prionopidæ*), and more particularly to the Warblers (*Sylviidæ*), it being often a matter of difficulty, as Dr. Sharpe has pointed out, to decide just where certain outlying genera should be placed. In a broad sense, however, according to Mr. Oates, the "Flycatchers may be known by the mottled plumage of the nestling, and by the presence of numerous hairs stretching from the forehead over the nostrils, and not unfrequently nearly to the base of the bill. They are not to be confounded with the rictal bristles, which are stiff and strong and lie laterally, nor are they to be confounded with the lengthened shafts of the frontal feathers, which in some of the Thrushes resemble hairs."

Typically the Flycatchers have a broad, flat bill, though in some it is extremely broad, and in others relatively long and slender or even diminutive; in all, however, both edges of the mandibles are smooth, the upper one with a simple terminal notch. The ten-primaried wing is variable, being usually long and pointed, but sometimes shorter and rounded. The tail is also variable, being sometimes comparatively short, but ordinarily it is relatively long, often graduated, and not unfrequently has the central pair of feathers enormously lengthened; the number of rectrices is always twelve. While it is difficult to describe the plumage in brief, comprehensive terms, in general it may be said that the prevailing hues are browns, chestnuts, olive-greens, blues of various shades, varied with black, white, and yellow. The sexes may be similar, but perhaps oftener are quite unlike; ornamental head crests are of frequent occurrence.

The Flycatchers, as implied by their name, are almost strictly insectivorous birds, catching most of their prey on the wing, though also seeking it to some extent among the branches and leaves of the trees or the backs of cattle or occasionally hovering like a small Hawk. They are tame, mostly solitary birds, sitting quietly on some vantage point from which they sally forth to capture an insect, often with an audible snap of the bill, and to which they return again and again. Some of them frequent the dense forests, but the majority prefer open woodland, orchards, and gardens, where they are seen singly or in pairs. They are rather weak though graceful on the wing, flying in an undulating or

zigzag though often dashing manner, and are wholly without reputation as songsters, their ordinary notes being weak and so persistently reiterated as to earn the deserving term of "monotonous"; their call notes are harsh. In the matter of nidification their habits are as various as might be supposed, some placing the nest in holes of trees or banks, while others build beautiful cup-shaped, arched, or domed structures in trees and at various heights from the ground.

This vast family — comprising nearly one hundred genera and over seven hundred species — is abundantly represented in the Ethiopian, Indian, Malayan, and Australian regions, with several species extending as far east as the Hawaiian Islands and a dozen into the Palæarctic region, of which number three or four reach the British Islands. Some of them are resident where found, but the majority are migratory to a greater or less extent, some making journeys of great length, as that of the Spotted Flycatcher (*Muscicapa grisola*), which reaches as far north as Lapland in summer and South Africa in winter. As many of the forms are very closely related and show correspondingly little difference in habits and characteristics, it is obvious that it will be neither expedient nor desirable to go extensively into their description; a few of the more marked or noteworthy forms selected here and there may serve, in addition to the general description already given, as a satisfactory exposition of this group.

Spotted Flycatcher. — In the typical genus (*Muscicapa*) embracing upward of twenty species, the wing is long and pointed, the tail square, and the plumage mostly brownish streaked with blackish; the length is between four and a half and six inches. The Spotted Flycatcher (*M. grisola*) already mentioned is a common species throughout Europe generally, being one of the most abundant, tame, and confiding summer visitors to Great Britain, where it arrives about the middle of May. Each pair takes possession of a very circumscribed area in a garden, orchard, or the borders of a field or meadow, and, unobtrusive and quiet, may be seen sitting on some dead branch, wire, or fence post, now and again taking short flights after passing insects and returning to the same perch, and, says Mr. Hudson, "of all our birds he is the least attractive, in his pale, obscure plumage, as he sits silent and motionless, listless and depressed in appearance, showing neither alarm nor curiosity when regarded." They soon begin nesting, placing the cup-shaped nest, which is composed of grass stems, moss, and rootlets and lined with hair, wool, and finer rootlets, in a vine growing against a wall, in a hole in a tree or wall, or sometimes in a bush. The four to five eggs are bluish white or pale green blotched and spotted with reddish brown. But a single brood is reared in a season, and usually by the middle of September they have all left for their winter home.

European Pied Flycatcher. — Closely related is the Pied Flycatcher (*M. atricapilla*), also of Europe generally, though rare and local in the British Islands, which has the upper parts mainly deep black and the lower parts pure white. It arrives earlier than the last, and is rather more of a forest-haunting bird and not so commonly found about human habitations. It has a soft *witt, witt*, as a call note, and a short, melancholy song which is said to somewhat resemble that

Fig. 194. — Blue-and-black Flycatcher, *Xanthopygia bella*.

of the Redstart (*Ruticilla*), but otherwise the habits are like those of its relatives. The eggs, however, are more numerous, sometimes numbering as many as eight, and they are pale, usually unspotted blue. Of similar habits but differing in having a white collar is the White-collared Flycatcher (*M. collaris*) of central and southern Europe, but of quite different appearance is the Red-breasted Flycatcher (*M. parva*), which has the chin, throat, and upper breast rusty orange. This little species is usually found in "groves and woods, especially when beech and fir trees are intermingled," and is much shyer than the others, spending most of the time among the higher branches of the trees. It is said to have a clear, rather sweet song which resembles that of the Wood Wren; it is very persistently uttered. The nest is almost always placed in a hollow tree and at no great distance above the ground, the five to seven eggs being white closely spotted with reddish.

Narcissus Flycatcher. — Of quite different appearance is the handsome little Narcissus Flycatcher (*Xanthopygia narcissina*) of Japan and China, the male of which has the upper parts deep black with a large patch of white on the wing-coverts, and the rump, lores, and a broad stripe over the eye bright lemon-yellow, while the chin, throat, and breast are bright orange-yellow, and the remainder of the lower parts pure white; the female is olive-brown above and yellowish white below. They are shy, retiring birds, frequenting dense forests, and are said to have a short but pleasing song. The nesting habits are similar to those of the species last mentioned, though the eggs are greenish white sparingly spotted with reddish.

Paradise Flycatchers. — Among the handsomest, and it may be added the most typical, members of the group are the Paradise Flycatchers (*Terpsiphone*), the twenty-five species of which are widely spread over Africa and southern Asia. They have an extremely large, depressed, and swollen bill, and numerous long, coarse, rictal bristles, while the two central tail-feathers in the mature male are enormously lengthened, indeed far exceeding the length of the body, and the head is provided with a crest. During the first two years the sexes in the Indian species are practically similar, the prevailing color being chestnut, and this the female never drops; but after the autumn moult of the third year the male assumes the long median tail-feathers and white under parts, though still retaining the chestnut upper parts. The full plumage is attained in the fourth year, when the entire body plumage is pure white, and this is retained through life; it is common, however, for them to mate while both are in the chestnut plumage. One of the best-known species is the Indian Paradise Flycatcher (*T. paradisi*), which ranges from Turkestan through the Himalayas and India to Ceylon, being resident where found, though it may move down to the plains from the higher mountains in winter. It is of solitary habits, frequenting forests and well-wooded districts, being especially fond of bamboo jungle. Mr. Dresser states that it is "restless and continually on the move from tree to tree. Its flight is undulating and it has a curious appearance on the wing, its long tail moving in jerks. Its note is a harsh, grating cry. It feeds on small flies and *Cicadellæ*, which it generally captures on the wing,

Fig. 195. — Madagascar Paradise Flycatcher, *Terpsiphone mutata*.

though it sometimes picks them off a leaf or bough. It breeds both on the plains and in the hills to an altitude of about 5500 feet, placing its nest in a tree, usually at some height above the ground. The nest is cup-shaped, rather shallow, constructed of moss, rootlets, vegetable fibers, and fine grass, interwoven with cobwebs, lined with finer grass and sometimes horse-hairs." The

four or five eggs are pinkish white closely spotted with brownish red. Our illustration shows the related Madagascar Paradise Flycatcher (*T. mutata*).

Fan-tailed Flycatchers. — Although there are many others of more or less interest, we shall have space to mention only the Fantails (*Rhipidura*), which are so named from the ample, well-graduated tail. They are very numerous, there being fully one hundred species, and are characterized by a very large bill which is about as long as broad, numerous long rictal bristles, and, as stated above, by the large fan-shaped tail; the sexes are nearly or quite alike in plumage. The Fantails inhabit the Oriental region, the Malay Archipelago, and the Australian region, including Tasmania, and all are practically resident where found. They are very active, lively little birds, being constantly on the move, and are often seen with outspread tail, "dancing from branch to branch" or tumbling in the air as they dart out to capture a passing insect. They all construct small, beautifully cup-shaped nests of fine grasses coated with cobwebs and usually placed on a large limb or in a forking branch.

Indian White-browed Fantail. — Of the four Indian species, the best-known is the White-browed Fantail (*R. albifrontata*), so named from a broad band of white on the forehead and over the eye, the upper parts being ashy brown, with the crown, sides of the head, chin, throat, and the sides of the body black, while the remainder of the lower parts are white; the length is about seven inches. It is common throughout the whole empire, ascending the Himalayas to 5000 feet and frequenting groves, especially of the mango. It nests from February to August, constructing the usual cup-shaped nest and laying usually three eggs, which are white or cream-colored spotted with grayish brown; two or more broods are reared in a season. With the general plumage of a dark sooty brown, relieved by a black crown, white eye stripe, and whitish throat, is the White-throated Fantail (*R. albicollis*), which Mr. Gould says is generally found in pairs, though occasionally four or five are seen together. It is one of the tamest birds imaginable, allowing a near approach without evincing the slightest timidity, even entering houses in pursuit of gnats and other insects. It inhabits alike, he says, the topmost branches of the higher trees, those of more moderate growth, and the gloomy foliaged dells in the neighborhood of rivulets; from these retreats it darts out a short distance to capture insects, and in most instances returns to the same branch it had left. When in the air it often assumes a number of lively and beautiful positions, at one moment mounting almost perpendicularly, constantly spreading out its tail to the full extent, and frequently tumbling completely over in the descent. They construct, according to Campbell, a neatly and marvelously made nest which is wine-glass shaped with the base of the stalk broken off, and saddled on a naked horizontal twig with the tail-like appendage extending below the twig; it is composed of fine grass and shreds of bark matted with cobwebs and lined with softer grass, and occasionally horse-hair. The two or three eggs are yellowish white, mottled and spotted with rufous and gray.

Black-and-white Fantail. — With a brief description of the Black-and-white Fantail (*R. tricolor*), also of Australia, we must close the account of this inter-

esting family. This trim little bird, often called the Wagtail and Traveler's Companion, has the general plumage glossy black, with a line over the eye and the lower parts white. It is one of the most tame and familiar of the Australian birds, says Mr. Gould, being constantly about the houses, gardens, and stock-yards of the settlers, often running along the backs of cattle, horses, and sheep in search of parasites, or hopping in the grass before the devouring mouths of such animals, watching for startled insects. It passes most of its time on the ground, over which it runs and darts with the utmost celerity, and when skirting the stream with tail erect and shaking from side to side, it presents an appearance very similar to that of the Pied Wagtails. It builds a cup-shaped nest, placing it often on a bare branch over water, and lays three or four creamy, spotted eggs; at least three broods are reared in a season.

THE THRUSHES

(Family *Turdidæ*)

The mere mention of the word *Thrush* at once suggests musical ability of a high order, and well it may, for the present group numbers among its members some of the most exquisite songsters of the whole bird world. The ringing flute-like notes of the Veery, the clear, pure *come-to-me* or *e-o-lie* of the Wood Thrush, the solemn, mysterious, silvery, bell-like tones of the Hermit Thrush, as they come to us from the cool depths of the forest, and the cheerful, extended vocabulary of the Robin, have placed them one and all high in the regard of lovers of bird music. The far-famed Nightingale of Europe, together with the Throstle, or Song Thrush, and the Blackbird and Robin Redbreast, so dear to English hearts, are all members of this widespread and highly musical family.

The *Turdidæ*, even as here restricted, are a large group, which, like many other passerine families, interdigitates at so many points with contiguous groups that it is difficult to draw any satisfactory circumscribing line. Some systematists have made it broad enough to include not only the more typical Thrushes and their obvious allies, but the Warblers (*Sylviidæ*), Mockingbirds (*Mimidæ*), Dippers (*Cinclidæ*), Gnatcatchers (*Polioptila*), etc., all of which, except possibly the last, are here regarded as entitled to full family rank. The number of minor groups that it is thought necessary to recognize within the family is also a subject for more or less extensive disagreement, but it is perhaps better to recognize a goodly number, as Dr. Sharpe has done in his "Hand List of Birds," and thus obviate the necessity of drawing the diagnosis so broad. The family comprises between five and six hundred forms disposed among some seventy genera, and if the New Zealand Thrushes (*Turnagra*) really belong here, which some doubt, it is practically cosmopolitan, though most abundant in the warmer parts of the Old World. They are medium-sized or small birds, generally with a relatively long, distinctly notched bill, which is more or less thickly beset with

rictal bristles, strong, long, or medium "booted" tarsi, generally long and pointed wings with ten primaries, and normally a square or rounded tail of twelve, or very exceptionally fourteen, feathers, though in the Solitaires, Bluebirds, etc., it is more or less emarginate. In color the plumage is ordinarily plain brown or black, often more or less varied with white, gray, chestnut, or rufous, and there is a decided tendency for the white breast to be spotted with brown; the nestling plumage is almost always spotted or squamated to a greater or less extent. They are largely terrestrial, some feeding exclusively on insects, while others, such as the true Thrushes, enjoy a mixed diet of insects and fruits.

Solitaires. —The members of the first subfamily (*Myadestinæ*), known collectively as the Solitaires, are distinguished from the true Thrushes by the possession of a short, broad, depressed bill and powerful rictal bristles. With the exception of a single Hawaiian genus, the half dozen genera and thirty forms are natives of the New World, ranging from northern South America over the Greater and Lesser Antilles, Central America, and Mexico, with a single species in the western United States. The latter, known as Townsend's Solitaire (*Myadestes townsendii*), is a loose-plumaged bird about eight inches long, of a medium brownish gray color, with an eye-ring, a wing-bar, and the tips of the outer tail-feathers white, and the bars of the wing-quills buff. "This exquisite songster," says Trippe, "is a permanent resident of the mountains of Colorado and may be seen at all times of the year, from the lower valleys of the country up to timber line, and in midsummer even beyond it to the highest limit of the shrubby willows and junipers. It is never a familiar bird, shunning the vicinity of houses and cultivated fields, and seeking the rockiest mountain sides and darkest canyons as its favorite haunts. During the winter it feeds on berries and such insects as it can find, but in the warmer months subsists almost entirely upon the latter, which it catches with the address of the most skilful Flycatcher. It is never gregarious, and usually solitary, associating together only from the time of pairing until the young are able to shift for themselves." Its wonderful song, which is often heard in the depth of winter, has in it "the notes of the Purple Finch, the Wood Thrush, and the Winter Wren, but blended into a silvery cascade of melody, that ripples and dances down the mountain sides as clear and sparkling as the mountain brook, filling the woods and valleys with ringing music." Their nest, a loosely constructed pile of weeds and trash, is placed on the ground, under an overhanging bank, or about the roots of trees, and contains three or four eggs of grayish white spotted with pale brown.

Passing over the second subfamily (*Cochoaninæ*), which comprises only a single genus and four Oriental species of purple and green Thrushes, we come to the typical Thrushes (*Turdinæ*), of which there are upward of two hundred and fifty forms.

Omitting a small number of West Indian forms known as Mockingbird-Thrushes (*Mimocichla*), we may commence our consideration of this group with the vast genus *Planesticus* (formerly *Merula*), the members of which are variously known as Blackbirds, Ouzels, etc. Although not very sharply differentiated from the genus *Turdus*, with which it is merged by many authorities,

the plumage of the adult is never spotted above or below, the ordinary colors being nearly uniform black (in males of some species only), brown, slate-gray, etc. They are widely but somewhat peculiarly distributed, about fifty of the one hundred and fifteen forms occurring in the New World south of Mexico, some twenty-five in Africa, and the remainder widely spread over Europe, Asia, and the Pacific islands. They are mainly terrestrial birds, frequenting meadows and fields in search of grubs and various insects, but they also subsist to a considerable extent on fruits, berries, and seeds. Perhaps the best-known is the so-called **Blackbird** (*P. merula*) of Europe generally, south of the Arctic Circle, whence it ranges as far as Syria, Egypt, Persia, and the Azores. About ten inches long, the male has the entire plumage deep black, with the bill and the orbits of the eyes orange-yellow, while the female is sooty brown. In the western portions of its range it comes as a summer visitor only, but otherwise it is a resident species or merely shifts its quarters to less exposed situations in the winter. Frequenting woods and groves, but more especially lawns, gardens, and cultivated fields, it is one of the most familiar of European birds, its clear, loud, melodious song endearing it to most people. It feeds on snails (the shells of which it breaks against a stone), insects, grubs, and earthworms, but during the fruit season becomes more or less troublesome to the gardener, greedily devouring cherries, currants, gooseberries, strawberries, etc. The nesting season extends from March to June, according to latitude, and two or three and sometimes as many as four broods are reared in a season. The nest, a rather large structure of twigs, roots, and coarse grass cemented together with mud and lined with softer grasses, is placed in a hedge-bush, evergreen tree, wall, or sometimes on the ground; the four to six eggs are light greenish blue spotted with reddish brown. The Blackbird was successfully introduced into Australia in 1864, especially in the vicinity of Melbourne.

American Robin. — We must not omit full mention of the American Robin (*P. migratorius*), which is beyond question the most abundant and best-known of all our Thrushes, ranging throughout eastern North America to the Rocky Mountains, including eastern Mexico and Alaska, and nesting from Virginia and Kansas northward to the Arctic coast. The majority spend the winter throughout the Southern States, but a few more hardy or venturesome than their fellows are found at this season in the dense swamps of the Northern States and even southern Canada. In western North America, from the eastern base of the Rocky Mountains westward and south to Lower California and the table-lands of Mexico, the place is taken by the Western Robin (*P. m. propinqua*), which differs mainly in the absence of a white tip to the outer tail-feathers.

As Mr. Henry Nehrling well says: "None of our birds has become so esteemed a favorite with the American people as the Robin. The Pilgrim Fathers of Massachusetts called this Thrush the Robin, or Robin Redbreast, because it reminded them of the affectionate and beloved Robin of their English home, and the love of the latter bird together with its name passed over to the somewhat similarly colored Thrush of their new country." It appears to have been originally a true forest bird, but with the advent of civilization it abandoned in large

measure its shyness and seclusion, and now comes freely and fearlessly about habitations, taking up its abode in orchards, gardens, and lawns, but it may also be found everywhere, in meadow and marsh, on hills and in valleys, and even high up in the mountains. It is one of the first to return from its winter home, often arriving in the north long before the snow and ice have disappeared, and with its bursts of wild, exultant music enlivens the otherwise dreary landscape and proclaims the advent of spring. Although it has lost or laid aside much of its original shyness, it still retains its former sagacity and vigilance, and we may see it running rapidly over the lawn for a few yards, with nervously dropping wings and vibrating tail, then stopping suddenly and standing erect and motionless for a few moments on the outlook for possible danger. The vocabulary of the Robin is extensive and varied, notes of interrogation, suspicion, alarm, and anger being apparently clearly discernible; while its song, which is usually uttered from some commanding position, such as a lofty tree-top, is given with such earnestness and persistence as to compensate for its alleged lack of sweetness and variety. The song is thought by many to resemble closely that of the European Blackbird, but it is apparently briefer and more monotonous. The Robin builds a large, poorly concealed nest of grasses, leaves, rootlets, etc., within which is a substantial lining wall of mud, which is itself lined with soft grasses. The nest, which is rarely more than ten or twelve feet from the ground, is usually placed in a fruit or shade tree, on a fence rail or stump, or occasionally in a porch or outbuilding; the four or five eggs are greenish blue and usually unmarked. They usually rear two, and in the southern part of their range sometimes three, broods in a season. A curious and interesting chapter in their life history was apparently first brought to scientific attention by Mr. William Brewster, some fifteen years ago. In the latter part of June, after the first broods are able to fly well, they are led nightly by the old males to some chosen roosting place, where they congregate either for companionship or mutual protection, in numbers that range from a hundred or two to very many thousands. These "roosts" are usually located in swampy areas, where there is a dense growth of thick-foliaged young trees, and each roost draws all the Robins from the surrounding country, often several square miles in area. They come trooping in from all directions about dusk and leave at the earliest break of dawn, the young to forage about the country and the old males to assist in caring for the second brood. When these are reared they, together with the old females, resort to the roost, which may then assume stupendous proportions. From this time until their departure in the fall they are found in flocks, often of large size, and in their winter home they are found together.

The food of the Robin is extremely varied, though always largely insectivorous. During their southern sojourn they feed particularly on berries of the holly, sparkle berry, etc., but after their return to the summer home they subsist, at first almost entirely on worms and insects of various kinds, and are then extremely valuable in reducing the numbers of these pests. But for this benefit to the agriculturist they levy tribute on the various small fruits, especially cherries, raspberries, and strawberries, and at times do considerable damage.

In the fall they resort in numbers to feed upon wild cherries, alder berries, of which they are excessively fond, as well as cedar berries, and altogether are of far more value than the price of the comparatively few fruits they consume.

South American Thrush. — The only other species of the genus that space will permit us to mention is the Dusky or South American Thrush (*P. amaurochalina*) of northern and eastern South America, which is olive gray above, becoming browner on the head and pale gray below with the throat and middle of the abdomen white. "It is," says Mr. Hudson, "a shy forest bird, a fruit and insect eater; abrupt in its motions; runs rapidly on the ground with beak elevated and at intervals pauses and shakes its tail; strong on the wing, its flight not being over the trees, but marked by their shadows." As a singer it takes high rank, perhaps the highest of any South American bird, its strains, usually given from the tree-top, being "poured forth in a continuous stream, with all the hurry and freedom of the Skylark's song, but though so rapidly uttered, every note is distinct and clear, and the voice singularly sweet and far-reaching." Its nest and eggs are closely similar to those of the last-mentioned species.

Ground Thrushes. — Perhaps most closely related to the last is a group of some half a dozen genera and upward of fifty species known as Ground Thrushes, which are characterized by having the sexes usually different and the under surface of the wing with a well-defined pattern of white. They are mainly sedentary and especially ground-haunting in their habits, having short, rounded wings and strong legs and feet. Being abundantly represented in Africa, southern Asia, and the large islands to the southward, they are the only members of the subfamily present in Australia and New Zealand, the former possessing four and the latter two species. The only species we may mention is the Siberian Ground Thrush (*Geocichla sibirica*), a bird about nine inches long, the male being slaty gray with a broad stripe of white over the eye and down the abdomen, and the female olive-brown above and buffish white below. After spending the summer in central and eastern Siberia, they retire to China, the Burmese provinces, and Java and Sumatra in winter. They frequent the ground in damp, wooded localities, feeding on worms, insects, and snails, and construct a rather rough nest of grasses, scantily walled with mud and lined with dry grass; it is usually placed in the fork of a tree near the ground, and the complement of four to six eggs are grayish or sometimes blue-green, finely spotted with reddish. A single species, known as the Varied Thrush (*Ixoreus nævia*), of extreme western North America, is the only representation of the group in the New World.

Coming now to a group in which, in addition to a marked structural distinction, the sexes are practically similar in plumage and the throat, breast, or flanks more or less spotted at all ages, the common Missel Thrush may be taken as typical of the genus *Turdus*. The Missel, or Mistletoe Thrush (*Turdus viscivorus*), of the Old World, which takes its name from its excessive fondness for the berries of the mistletoe, has habits quite similar to those of the American Robin just described. It is larger than the Robin, attaining a length of twelve inches, its color being grayish brown above and buffy white boldly spotted with blackish

below. It ranges throughout northern and central Europe and eastern Asia, breeding at the north and wintering partially in the more southern districts, being for example particularly abundant in the British Islands, where it has greatly increased in recent years and where it frequents woods, orchards, parks, and gardens the year round. During the nesting season it apparently recognizes the protection afforded by the proximity to human habitations and is there fairly tame; but when the young are reared they congregate in flocks of a dozen to fifty or more and become very shy and difficult to approach. Their food in summer consists largely of insects, worms, snails, etc., but in winter they subsist on berries of the mistletoe, yew, service trees, and such insects as they chance to get. They mate early, usually the first part of February, and soon set about nest building, placing the bulky Robin-like nest in a tree, usually at some distance from the ground, and deposit four or five eggs, which are reddish gray or brownish olive spotted with chocolate. They are silent at this season unless disturbed, when they become clamorous and vigorous in the defense of their treasures, not hesitating to attack birds of large size; two or three broods are reared in a season. The Mistletoe Thrush is one of the few birds that sings during the winter and in the most inclement weather, "and it is this habit," says Hudson, "and something in the wild and defiant character of the song, heard above the tumult of nature, which has won for him the proud name of Storm-cock."

Fig. 196. — European Song Thrush, *Turdus musicus*.

Fieldfare. — One of the commonest Thrushes of the north is the Fieldfare (*T. pilaris*), which in summer occurs from the Atlantic as far east as Yenisei valley in Siberia, coming south in winter to Turkestan on the east and North Africa on the west, being especially abundant in Great Britain at this season. It is gregarious all the year round, often occurring in immense flocks during the migrations which are performed at night. It breeds in scattered colonies, usually placing the nest in low trees such as fir trees and birches, constructing it of grasses, pine twigs, and moss, with a shell of mud and an inner lining of fine grass; the four or five eggs are greenish blue spotted with reddish brown. The young at first are quite tame, but they soon become shy and in their winter homes are usually seen in fields and meadows if the ground is bare of snow, otherwise they repair to hedges and shrubbery, where they feed upon hips and haws. Their ordinary note is loud and harsh, but in summer they have a lower, rather indifferent song which is generally uttered while the birds are on the wing. In color the Fieldfare has the head and neck ashy gray, the back and wing-coverts chestnut-brown, and the throat and chin yellow streaked with black, while the lower parts are reddish brown spotted with black.

The **Ring Ouzel**, sometimes called the Mountain Blackbird (*T. torquatus*), is an easily recognized bird, its entire plumage being brownish black set off by a crescent-shaped mark of white across the chest and an orange bill. It spends the summer on the moors and pine-clad highlands of northern Europe, and the winters in central and southern Europe, there often frequenting cultivated fields and gardens, where its habits are much like those of its relative, the Blackbird. Its nest is also like that of the Blackbird, being usually placed in a low bush, in banks, or on the ground. The song is powerful and far-reaching but is rather monotonous and altogether not of a high order. A well-marked geographical race (*T. alpestris*), with the feathers of the lower parts white-margined, occurs in the Alps of central and southern Europe.

Wood Thrush. — Beyond doubt the best singers of the entire subfamily are to be found within the genus *Hylocichla*, all of the twelve forms of which are natives of North America. They have usually been placed with the members of the last genus, but are much smaller and more slender birds, with relatively much longer tarsi and smaller bill, their plumage being plain, usually uniform brown above and whitish or buffy boldly spotted with brown or blackish beneath. Of these the Wood Thrush (*H. mustelina*) of the eastern United States is easily distinguished by the bright cinnamon of the anterior upper parts and conspicuously spotted breast and sides. It is a gentle, lovable bird, rather shunning the noisy haunts of man and preferring low damp woodlands especially where there are dense patches of undergrowth into which he can plunge when alarmed. He is tamer than many of his relatives, permitting a quiet approach and inspection, but if too closely pressed, retreats with a sharp cry of alarm, which becomes still louder and more anxious if the nest or young are threatened. But it is when perched on some tree-top that he pours forth his exquisite song, which, "although composed of but few notes, is so powerful, distinct, clear, and mellow that it is impossible for any person to hear it without being struck by the effect which it produces on the mind. I do not know to what instrumental sounds I can compare these notes, for I really know none so melodious and harmonious." — Audubon. The nest, which is usually placed in a bush or low sapling a few feet from the ground, is composed of grass stems, weed stalks, strips of bark and leaves, with an inner wall of mud and a lining of rootlets and soft grass. The eggs are from three to five in number and of a greenish blue color. The Wood Thrush spends the winter months mostly in Central America, and reaches his northern home about the middle of May, where his presence is announced by the ever welcome song.

The **Wilson's Thrush**, or **Veery** (*H. fuscescens*), also of eastern North America, is smaller than the last, has the entire upper parts cinnamon-brown, the middle of the throat, abdomen, and sides white, and the sides of the throat and breast with small, wedge-shaped spots or streaks of brown. Much shyer and more retiring than the Wood Thrush, it frequents low, damp woodlands, spending most of its time on the ground. "The Veery's usual call note," says Mr. Chapman, "is a clearly whistled *wheeu*, which can be closely imitated; his song is a weird, ringing monotone of blended alto and soprano notes. Neither notes nor

letters can tell of its peculiar quality; it has neither break nor pause, and seems to emanate from no one place. If you can imagine the syllables *vee-r-r-hu* repeated eight or nine times around a series of intertwining circles, the description might enable you to recognize the Veery's song." The nest, which is without mud in its construction, is placed on or near the ground, and the eggs resemble those of the Wood Thrush.

Olive-backed Thrush. — Known to the residents of eastern United States mainly as a migrant, the charming little Olive-backed Thrush (*H. ustulata swainsonii*) slips through in silent little parties to its summer home in the coniferous forests of the north, though a few stop to breed in the higher Alleghanies and the mountains of New England; it spends the winter in Cuba, Central America, and northern South America. During its brief sojourn in the south it frequents especially the borders of clearings, where it is wont to select some point of vantage, preferably a dead tree-top, from which it pours forth its ringing song. The nest is placed in a low tree and but four or five feet from the ground; the eggs, usually three or four, are greenish blue spotted with brownish.

Hermit Thrush. — Sharing the northern summer home with the last is the prince of all these Thrushes, the exquisite Hermit (*H. guttata pallasii*), so named from its pronounced preference for the quiet depths of the forest. Coming early in spring, — the earliest of the Thrushes, — they tarry latest in the fall, frequenting while en route the low, damp, bushy edges of woods, the dense shrubbery along streams, and occasionally they may enter gardens about houses. It spends some time on the ground, but is usually to be seen flitting from branch to branch. Of its song Coues says: "The weird associations of the spot where the Hermit triumphs, the mystery inseparable from the voice of an unseen musician, conspire to heighten the effect of the sweet, silvery, bell-like notes, which, beginning soft, low, and tinkling, rise higher and higher, to end abruptly with a clear, ringing intonation." The nest of grass, leaves, and moss is placed on the ground, and the eggs are the usual greenish blue. The Hermit Thrush may be known from the others by its olive-brown upper parts and pale rufous tail, as also its near relatives, the Alaska, Dwarf, and Audubon's Hermit Thrushes (*H. guttata*, *H. g. nana*, and *H. g. auduboni*), which together range quite across the continent.

Rock Thrushes. — With the Rock Thrushes of the Old World, a small group of two genera and a dozen species, we may close our account of this subfamily. As the name implies, they are rock-haunting birds, frequenting open, rocky wastes, usually solitary in their habits, and distinguished by a stout, straight bill, rather short wings and tail, and a plumage in which there is much blue, chestnut, or black, especially below. The common Rock Thrush (*Monticola saxatilis*) is found in summer in central and southern Europe, east to central Africa, and north to southern Siberia, wintering in Africa and India. It is a shy, wary bird, frequenting barren, rocky localities, old ruins, and walled gardens, where it may be seen constantly vibrating its tail after the manner of the Redstart, and giving voice to its sweet and varied song. If taken from the nest when young and reared in confinement, it becomes an attractive cage bird and as such is much esteemed. The rather loosely constructed nest is sometimes placed in a

hole in a wall, but usually in a crevice in a rocky cliff, often near a waterfall. The four or five eggs are light blue or greenish blue.

Accentors.—The position of the Accentors, which constitute the next subfamily (*Accentorinæ*), has been much in dispute, some placing them among the Warblers, others with the Tits, Sparrows, and Bluebirds. They are small, dark-plumaged birds, with a short, rather weak, sharp-pointed bill, but few and weak rictal bristles, weak wings, and a nearly square or slightly forked tail. Most of them frequent high mountains in summer, often up to the snow line, but coming down to the valleys in winter, while others, such as the common and familiar Hedge Sparrow (*Accentor modularis*) of Europe, inhabit gardens and cultivated spots, where they hop about in the hedges and low shrubbery. Their food consists principally of insects, varied, it is said, with occasional seeds, and their nests, which are usually composed of mosses and grass, lined with hair or wool, are placed in hedges, low bushes, or in holes in rocks; the eggs are blue. The twenty species which are sometimes referred to two genera are found mainly in Europe and northern Asia, or wholly within the Palæarctic area.

The **Bush Chats** (*Ephthianura*) of Australia, although regarded by Dr. Sharpe as a subfamily of Thrush-like birds, would seem to be best placed elsewhere, being sprightly, active, Sparrow like birds, going about in small or sometimes very large flocks, and frequenting low scrub and waste land, especially near water, as well as the dryest deserts of the interior. They are usually observed on the ground or in low growth, and the bright-colored males have the habit of perching on the summit of a stone or the extremity of a dead branch; they are said to have but a single plaintive note which is uttered while on the wing or when the nest is threatened. They often nest near each other, building a cup-shaped structure usually in a bush a few inches above the ground. But four and a half inches long, the male of the White-fronted Bush Chat (*E. albifrons*) of East and South Australia is light gray above with a tuft of white-tipped plumes on the sides of the rump, while the forehead, face, throat, and all the under surface are pure white, the breast crossed by a broad crescent of black; the female is grayish brown above and buffy white below, with a slight crescent of black on the breast. The Tricolored Bush Chat (*E. tricolor*) of the inland provinces has a handsome plumage of scarlet, brown, and white.

Redstarts.—The next subfamily (*Ruticillinæ*) composes a notable assemblage of birds, among them the Redstarts, Robins, Bluethroats, and Nightingales, which in a way connect the true Thrushes with the Chats. They are small, mainly terrestrial, migratory birds, with relatively long tarsi and strong feet, and subsist mostly upon insects; among them are a number of incomparable songsters.

The true Redstarts (*Phœnicurus*) number about fifteen species, which are confined to northern Africa, Europe, and Asia north of the Himalayas. Not exceeding six or seven inches in length, they may be known by the short, slender black bill, sharply pointed wings, and a rather long, square tail, which, together with the rump, is mostly chestnut or reddish in color. Of the two species found in Europe the prettiest is the little Redstart, or Firetail (*P. phœnicurus*), which

spends the summer months from April to August in Europe and eastern and central Siberia and the winter in West and equatorial Africa. A familiar bird to people in country districts, the male has the forehead white, the head and upper parts of the back slate-gray, the rump, upper tail-coverts, and tail chestnut-red, while the cheeks and throat are jet-black and the breast orange-rufous or chestnut. It is an active and spritely though somewhat shy bird, frequenting groves, parks, and gardens, and constantly flirting the tail as it moves about the walls, crumbling ruins, and shrubbery. It feeds on insects, caterpillars, and grubs, which it seeks on bushes, walls, or the ground, and on flies and gnats which it catches on the wing with all the facility of a true Flycatcher. A clear whistle answers for its call note, while its song, which it usually utters while it perches on a twig, is a short, feeble, and monotonous, though rather sweet, chant. The nest of the Redstart is a loosely made structure of dry grass, roots, and moss, lined with hair or feathers, and placed in a hole, usually in a wall, but sometimes in a hollow tree. The five to eight eggs are greenish blue, usually unspotted but occasionally with a few obscure dots of reddish.

Black Redstart. — Even more familiar and better known is the Black Redstart (*P. titys*) of central and southern Europe in summer and north coast of Africa in winter. Although tamer than its relative, its habits do not greatly differ, and its song and call notes are similar. It is, however, more given to frequenting the vicinity of farm buildings and other human habitations, coming even into towns and cities, and often chanting its notes from a housetop. It is a persistent singer in fair weather, commencing early in the morning and continuing almost uninterruptedly until late evening, but in inclement weather it appears disconsolate and sits in dejected attitude. The nests, similar in construction to those of the Redstart, are placed in holes of buildings, in clefts of rocks, or holes in walls. The five or six eggs are pure white. After the first brood is on the wing they are turned over to the care of the male, and the female deposits a second set of eggs. This species does not breed in the British Islands, but a greater or less number reach there annually, mostly in fall and winter, sometimes passing this entire season about cliffs and dwellings. The male Black Redstart has the upper parts dark slate-gray, the rump and tail chestnut-red, except the central pair of feathers which are dark brown, while the neck, throat, and breast are deep black and other under parts slate-gray; the female is mainly sooty brownish gray, the young resembling the female.

Bluethroats. — Although approaching the Redbreast (*Erithacus*) and often placed with it, the beautiful Bluethroats (*Cyanosylvia*), of which four forms are now recognized, seem worthy of generic separation, being distinguished by a very short tail, the basal half of which is chestnut, and the brilliant blue chin and throat in the males, the whole upper plumage being brown. The Red-spotted Bluethroat (*C. suecica*), so called from the presence of a rufous spot in the center of the throat, reaches in May its summer home in the north of Europe and Asia up to the Arctic Circle, the males preceding the females by a few days; in August they leave on the return journey to spend the winter in northern Africa and India. They frequent especially swampy ground, thick grass jungle, and

willow thickets near water, spending most of the time on the ground, along which they run with ease, elevating and sometimes expanding the tail at the end of each short course of running. The song of the male, usually uttered from the top of a bush or dead tree, sometimes on the wing, is, according to Mr. Seebohm, a fine production, resembling or combining that of a number of other birds such as the Wagtail, Blackbird, and Chaffinch, and, he adds, "as he improves in voice he sings louder and longer, until at last he almost approaches the Nightingale in the richness of the melody that he pours forth. When the females have arrived, there comes at the end of his song the most metallic notes I have ever heard a bird utter. It is a sort of *ting ting*, resembling the sound produced by striking a suspended bar of steel with another piece of the same metal." The nest is composed of dry grasses and lined with rootlets and hair, and is usually well concealed in a tussock of grass or in the side of a bank. The five or six eggs are greenish or bluish olive in color. The White-throated Bluethroat (*C. cyanecula*), which summers in central Europe, differs from the last in the male having the patch on the throat white instead of rufous, or sometimes it is wanting altogether; the females and young of the two species appear inseparable.

Redbreast, or English Robin. — Of all European birds perhaps none is a more universal favorite than the little Redbreast, or Robin (*Erithacus rubecula*). A little less than six inches long, it has the upper parts olive-brown, the forehead, chin, throat, and breast a rich orange-rufous, and the remainder of the lower parts white; the female is a little smaller and less brightly colored than the male. Tame and familiar to a degree, the Robin attaches himself to scenes of human activities, at times, especially in winter, even entering the houses in quest of crumbs. Some of them, particularly the young of the year, may migrate to the Mediterranean countries in winter, but many always remain to brave the advent of ice and snow, and it is then more especially that their presence and song are most in evidence and most appreciated. "Even more than beauty in coloring and form is a sweet voice, and here, where good singers are not few, the Robin is among the best. Not only is he a fine singer, but in the almost voiceless autumn season, and in winter, when the other melodists are silent, the Robin still warbles his gushing, careless strain, varying his notes at every repetition, fresh and glad and brilliant as in the springtime. His song, indeed, never seems so sweet and impressive as in the silent and dreary season." — HUDSON.

FIG. 197. — Redbreast, or English Robin, *Erithacus rubecula*.

Rubythroats. — Closely allied to the Bluethroats, but lacking the chestnut on the tail and the male with the throat a brilliant scarlet instead of blue, are the Rubythroats (*Calliope*), of which some half a dozen species are known. Their habits are similar to those of their relatives, all being migratory and

spending most of their time on the ground in thick cover. The Siberian Ruby-throat (*C. calliope*) passes the summer months in northern Asia up to the Arctic Circle, and the winter in the southern countries, even reaching the Philippines; it is a shy, solitary bird and has a low but very sweet song, which is said to be but little inferior to that of the Nightingale. It nests on the ground and lays four or five greenish blue, sparingly spotted eggs.

Nightingales. — Widely heralded in song and story as the producer of the highest and most perfect type of bird music is the celebrated Nightingale, but, says Mr. Hudson, the distinguished English ornithologist, "it is the only songster that has been too much lauded, with the inevitable result that its melody, when first heard, causes disappointment, and even incredulity." It was selected centuries ago, perhaps on account of its singing at night when most other voices are silent, "as the highest example of a perfect singer, and, on the principle that to him that hath shall be given, it was credited with all the best qualities of all the other singers. It was the maker of ravishing music and a type, just as the Pelican was a type of parental affection and self-sacrifice, and the Turtle Dove of conjugal fidelity." Notwithstanding these deprecatory statements, it is a fine singer, and well merits a high place in the affections of all lovers of bird music.

The Nightingale (*Ædon megarhyncha*, or *Daulias luscinia* of authors) is a small, plain bird, being only a trifle over six inches long, uniform brown tinged with rufous above and grayish white beneath. It is a migratory species, coming in April from its winter home in Africa to southern and central Europe, returning year after year to the same localities. It is ordinarily a rather shy bird, frequenting woodlands, groves, bramble thickets, and hedges, especially along streams, where it secures its food, which consists exclusively of insects, mainly on the ground, in general habits and appearance much resembling the Robin just described. "It has the habit of hopping rapidly by fits and starts, standing erect and motionless at intervals as if to listen, and occasionally throwing up the tail and lowering the head and wings, just as the Robin does." It commences to sing a few days after its arrival, keeping it up until the young are hatched in June, singing in fine weather at intervals during the day and often late into the night. The Nightingale makes a rather large, loose nest of dead leaves and grasses, lined with finer grasses, rootlets, and occasionally horse-hair, placing it on or near the ground under a hedge or in a dense thicket. The eggs are from four to six in number, of a deep olive-brown color and unspotted; but a single brood is reared. The female is solicitous for the care of the eggs and young, and at this season often permits of a close approach. Of the four other species the Thrush, or Western Nightingale (*Æ. philomela*), of Europe, southwestern Siberia, and Asia Minor is larger, less rufescent in color, and has a more powerful but not so sweet song, while the Persian Nightingale (*Æ. golzii*) of central Asia has the whole upper plumage russet-brown.

Magpie-Robins. — Although not having by any means exhausted the resources of this interesting subfamily, we may close our account with brief mention of the Magpie-Robins (*Copsychus*), which are characterized by the possession

of a tail which is the equal of the wing in length, graduated and colored black and white, at least in the Indian species, whence their common name. Of the seven species, five are natives of India, the Malay Peninsula, and large islands beyond, while a single one each is found in the Seychelles and Madagascar. The Indian Magpie-Robin, or Dayal Bird (*C. saularis*), is a common and familiar bird throughout the Indian peninsula, Ceylon, and China, being about eight inches long and having the head, neck, and breast and upper plumage glossy black, the wing with a conspicuous patch of white, while the abdomen and sides are white, as are all but the two median pairs of tail feathers. In habits it much resembles the Robin, coming about houses and even entering them in quest of its food of insects. Its song resembles that of the English Robin, but is rather louder. It constructs a rough nest in walls, holes in trees, or in houses, laying four or five greenish eggs which are spotted with reddish brown.

Chats. — The Chats, which comprise some ten genera and over one hundred species, form a natural subfamily (*Saxicolinæ*) of the Thrushes, being, as already pointed out, more like Flycatchers in their habits than most of the others, since they secure their insect food by sallies from a fixed perch. They have a relatively strong bill, usually well-developed rictal bristles, a generally pointed wing, and a moderate tail; the sexes are usually very different in coloration. A marked characteristic of the Chats is their habit of vibrating and expanding the tail both while perching and running.

Whinchat. — Passing over a couple of African genera, we may first consider the Whinchat (*Pratincola*) and its allies, which are characterized by having the bill broad at the base, well notched and beset with numerous strong rictal bristles, while the tail is shorter than the wing. Familiar and generally fearless little birds, they comprise over twenty species often of wide distribution, some of which are migratory and others mainly resident. In all, the sexes are unlike in coloration and there are very marked seasonal differences of plumage. The Whinchat *par excellence* (*P. rubetra*) occurs in Europe generally up to the Arctic Circle and east to Persia, migrating in winter to Africa. It is a plain-plumaged bird, a little over five inches long, dusky brown above, the feathers edged with reddish yellow, the wings dark brown with a large patch of white, a similar patch occurring at the base of the tail, while a stripe over the eye, the sides of the neck, and throat are white, and the abdomen and flanks yellowish white; the female is duller and has the white wing-patch smaller. The Whinchat arrives from the south in April or May, beginning the return journey in August or September, adopting certain regular routes along which it is often very abundant. It inhabits open grassy country, commons, heaths, pastures, and mountain sides, where it spends the greater portion of its time on the ground, though it is fond of perching on bushes and low trees, from which it captures passing insects. It is a restless, active bird, continually flitting about, giving constant voice to its short, sharp call note like the word *utick*, whence its name of Chat. It has a low but sweet and agreeable, warbling song, which is uttered both from a perch and on the wing, and which is most in evidence during the mating season. The nest, made of grasses and moss and lined with rootlets and

horse-hair, is usually placed on the ground under a tuft of tall grass or heather, and in it the female deposits four to six greenish blue, faintly spotted eggs.

Stonechat. — Inhabiting practically the same area and occurring in much the same situation, is the little Stonechat (*P. rubicola*), which takes its name from its peculiar scolding notes of *tak, tak,* which resemble the sound produced by striking two small pebbles together. It is, however, more attractively colored than its relative, the male having the head and throat black, the sides of the neck, tertial wing-coverts, and rump white, and the breast chestnut-rufous, paling to light rufous on the abdomen. Its food and nesting habits are practically the same as those of the Whinchat.

Wheatears. — On the basis of a narrow bill and few, weak rictal bristles, the Wheatears (*Saxicola*) are separated generically from the last. They are essentially inhabitants of deserts and waste places, a majority of the upward of fifty species occurring in the drier areas of northern Africa and southwestern Asia, though a number are found in Europe and other parts of the Palæarctic region, among them the Common Wheatear (*S. œnanthe*), which ranges over Europe and northern Asia, reaching even Iceland, Greenland, Labrador, and Alaska; it winters in northern Africa. This species in summer has the upper parts light gray, the forehead and upper tail-coverts white, and the sides of the head black, while the basal two thirds of the tail is white and the under parts whitish or buffy; the female is duller and more buffy. The Wheatear does not perch on trees or bushes, being preëminently a bird of the ground, over which it runs with ease and rapidity. It is found in open and barren, especially stony, localities, such as mountain sides and rocky shores, and is intolerant of the advent of cultivation, disappearing utterly before the plow. During the migrations, which occur in February and March, and in August and September, on the return journey, they often appear in multitudes especially on the south and east coasts of England, but soon hurry to their distant nesting grounds. When they return in the fall, they are often excessively fat, and are then esteemed a great delicacy, many thousands often being netted for food. The Wheatear builds a large flat nest on the ground under a stone or clod of earth, or in walls or stone heaps, depositing from four to seven eggs of a pale greenish blue color and usually unspotted. The call notes are very much like those of the Stonechat, and its song, which is uttered while on the wing or perched on some slight projecting stone or clod, is described as sweet, though rather short. Although possessing more or less individual interest, the general appearance and habits of the numerous Wheatears are similar to those described above, and we may pass them over.

Bluebirds. — With the exception of a single species perhaps doubtfully referred here (the Himalayan Bluebird, *Grandala cœlicolor,* which occurs in the higher Himalayas), the entire membership in the final subfamily (*Sialiinæ*) is confined to the New World, the typical representatives being the Bluebirds (*Sialia*), which in eight or ten species and subspecies spread over the whole of North America and through Mexico to Guatemala, Honduras, and Bermuda. They have a short, stout, compressed bill, short rictal bristles, and pointed wings

which are much longer than the slightly emarginate tail. They are handsome birds, the adult males being bright blue above and cinnamon and white, blue and chestnut, or blue and white beneath; the females are duller than the males, and the young are spotted and streaked with white.

Too well known, perhaps, to need extended introduction, the Eastern Bluebird (*S. sialis*) is as widely and affectionately known to all residents of eastern North America as any native bird, hardly excepting his relative, the Robin. Gentle and lovable in disposition, he comes fearlessly about houses and gardens, having the "blue of the sky upon his back and on his breast the tints of its rosy dawn," a veritable harbinger of spring and messenger of good cheer. Although generally migratory everywhere, a few may occasionally be seen in winter even in the most northern states, but the majority spend the colder months in the south, where in companies they congregate to feed upon the berries of the mistletoe, red cedar, and other like fruits. But in earliest spring, often in February and March, they suddenly appear in couples in their summer haunts in the north, returning year after year to the same localities. Not infrequently, however, they are overtaken by a sudden cold wave, and, as happened some years ago, perish by thousands. As soon as weather conditions permit, they set about house hunting, and after the inspection of all available sites select a nesting box, a hole in a tree, a hollow post or fence rail, and upon a scant lining of soft grasses deposit from four to six pale blue, rarely white, unspotted eggs. They are often annoyed and frequently dispossessed of their nesting site by the pestiferous House Sparrow, especially in towns and cities, though in country districts they manage to hold their own. During summer the Bluebird feeds almost exclusively upon insects, such as grasshoppers, beetles, moths, and spiders, often flying to the ground for their capture; but it does not hop upon the ground, simply alighting there to secure one it has spied from a vantage point on fence post or dead weed stalk, and to which it at once returns. After rearing several broods, they congregate in small parties in pastures, stumpy fields, and cleared woods, and seem loath to leave, but at last when the warning of approaching winter can no longer be unheeded, they start with sadly plaintive calls quite unlike their cheerful spring notes for their winter home. The Bluebird is not often kept in confinement in this country, but it is frequently taken as a cage bird to Europe, where it is known as the Blue Robin. It is said to make an engaging pet, and even breeds in captivity.

Of the other species, the Mexican Bluebird (*S. mexicana*) of southern Mexico has little if any chestnut on the back, the blue being of a very rich, deep hue, while a subspecies of this, known as the Western Bluebird (*S. m. occidentalis*), which is of smaller size and lighter blue above, takes the place of the Eastern species throughout the western United States in general. The Mountain Bluebird (*S. arctica*) is distinguished at once by the rich, glossy cerulean blue above and lighter blue below; it occurs in the Rocky Mountains and adjacent areas.

Thrush-Robins. — Although the so-called Thrush-Robins (*Catharus*) of the neotropical regions have been placed by some authorities with the Bluebirds, they are undoubtedly much more closely related to the Wood Thrushes (*Hylo-*

cichla), differing from them principally in having a more rounded wing. Like the latter, they are all terrestrial birds, frequenting dense brushwood or the primeval forests, where they are generally to be observed searching amongst dead leaves for their food. They range in altitude from a little above sea-level to over 10,000 feet in the mountains, and are usually rather tame birds, permitting close observation. In coloration they are brownish or slate-gray above, the head often black or gray and grayish white or occasionally spotted below, one of the best-known being the common Central American Thrush-Robin (*C. melpomene*). It nests frequently in gardens, making an open nest chiefly of moss and laying white eggs which are thickly marked with reddish.

THE WREN-THRUSHES

(Family *Zeledoniidæ*)

The present "family," recently established by Mr. Ridgway, comprises but a single genus and species (*Zeledonia coronata*), which is confined so far as now known to the summits of the high volcanoes of Costa Rica and Panama. It is a small, somewhat Wren-like or Thrush-like bird, a little over four inches in length, with relatively very long legs, short very concave rounded wings with only nine obvious primaries, and an extremely short tail of only ten feathers, these being pointed at the tip and having their webs lax or semi-decomposed, while the basal segment of the middle toe is adherent for half its length to the outer toe. With the exception of an orange-rufous crown patch, the coloration is plain olive or olive-green above and plain slate-color or slate-gray below, becoming olive on flanks and under tail-coverts. The Wren-Thrush, as it has been called, has usually been placed, though somewhat doubtfully, with the Thrushes (*Turdidæ*) and next the so-called Forest Thrushes (*Catharus*), but the recent studies of Mr. Pycraft appear to have demonstrated that it must be removed from the *Turdidæ*, and while its affinities are still obscure it is perhaps best located for the present between the Thrushes and Mockingbirds. Its nidification is entirely unknown, and indeed little is recorded of its habits beyond the fact that it is usually found on the ground in the dense jungles of the above-mentioned volcanoes at an elevation of between 6000 and 7000 feet.

THE MOCKINGBIRDS

(Family *Mimidæ*)

Of a somewhat Thrush-like appearance, the members of the present group have often been — and by some are still — placed among the Thrushes (*Turdidæ*), but as a matter of fact they are a distant group though rather closely related to the Wrens (*Troglodytidæ*), about the only external difference from the latter being their generally larger size and strong rictal bristles. From the Thrushes

they differ in the lengthened and more or less decurved bill, short concave wings, longer, much more graduated, and broader tail, and tarsi which are strongly scutellated in front. They have, however, much the same habits as the true Thrushes, being mainly insectivorous, but also feeding on various soft fruits and as a rule preferring shrubbery to high open woodland and usually keeping nearer the ground, some being decidedly terrestrial, as indicated by their large, strong feet. This family, which is not a large one, is confined entirely to the New World, being most abundant in the warmer parts of the hemisphere, with only about a dozen of the seventy forms inhabiting North America. Although none is possessed of bright plumage, the colors being principally plain hues of brown, gray, or plumbeous, they make up by the wonderfully attractive quality of their songs, the Mockingbird, for instance, enjoying a national reputation as the equal if not indeed the superior of the Nightingale. Dr. Shufeldt puts it strongly when he says that his "faith in the powers of the Mockingbird is so firm that I believe were he successfully introduced into those countries where the Nightingale flourishes, that princely performer might some day wince as he was obliged to listen to his own most powerful strains poured forth with all their native purity by this king of feathered mockers."

The **True Mockingbirds** (*Mimus*), of which over twenty forms are recognized, have the bill about half the length of the head, slightly decurved and notched at the tip, while the wings are pointed and shorter than the tail, which is long and rounded and composed of rather narrow feathers. Quite generally spread over South and Central America and the West Indies, the only species entering the United States is the Mockingbird *par excellence* (*M. polyglottus*), which, with a single western subspecies, spreads entirely across the continent, though becoming rare north of the 38th parallel. In the northern portion of their range they are mainly summer visitors, only an occasional individual spending the winter; but in the south they are permanent residents, frequenting the borders of woods, prairie thickets, and the bushy edges of swamps, as well as parks, gardens, and city squares. Some years ago I found them very abundant and quite at home in the willow and poplar thickets along the San Juan River in southwestern Colorado and northern New Mexico. Active, alert, and watchful, though not ordinarily shy, they are the embodiment of grace and quiet beauty, by preference coming into the presence of man to rear their young. They make a bulky, conspicuous nest of twigs, weed stalks, moss, etc., lined with rootlets and finer grass, placing it near the ground in thickets, hedges, climbing roses, low trees, the corners of rail fences, and like situations. The eggs, four or five in number, are pale greenish blue, spotted and blotched with reddish brown. In the south two broods are usually reared, farther north but one.

The musical and above all the imitative ability of the Mockingbird has been so well set forth by Dr. Shufeldt that we venture to quote from his interesting account: "For thorough appreciation, one should catch him upon a dewy morning just as the sun rises and he flits to the top of some low tree to pour forth his medley of carols in soul-felt welcoming. This may be in some quarter of the sunny south, perhaps near the manor-house of some broad plantation,

where not only can he imitate any individual of the host of native songsters about him, but vary the strain with those familiar sounds heard about the house and barnyard. To see that little feathered being so brimful of ecstasy, replete with action and animation, drooping his wings, spreading his tail, so buoyant as hardly to be able to retain his perch, while the air is actually filled with his inimitable musical performances, is a sight not likely to be forgotten. Clearly and with the greatest possible accuracy and rapidity, and with a mellow strength even exceeding the originals, he utters the notes and calls of twenty or more birds in succession, ranging all the way from the plaintive air of the Bluebirds to the harsh, discordant cries of the Jays, Sparrows, Hawks, and even with equal compass the vociferations of an Eagle. Catching breath and tossing himself lightly into the air above his perch, he alarms the entire feathered community assembled by his imitating the cries of a wounded bird in the talons of a Hawk; this is followed perhaps by the crowing of a Cock or the vociferous note of a Whippoorwill, and the very incongruity appears to put his feathered listeners to shame at the hoax." As might be imagined, such varied powers of mimicry make him prized as a cage bird, and, captivity seeming hardly to diminish these accomplishments, he is frequently confined, though to be fully appreciated the Mockingbird must be heard in his chosen setting.

All of the members of this genus appear to possess in greater or less degree this marvelous faculty of reproducing the notes of their feathered companions, in addition to which some at least possess matchless songs of their own. Such an one — the White-banded Mockingbird (*M. triurus*) — Mr. Hudson tells enthusiastically of having heard in bleak, far-away Patagonia, a song which he believed the superior of that of any feathered songster on the globe.

On the ground that they possess a larger, more compressed bill and a much longer tarsus, the Mockingbirds of the Galapagos Archipelago, of which there are upward of a dozen forms, have been separated as a distinct genus (*Nesomimus*); their habits are presumably similar to those of the Mockingbirds in general.

Sage Thrasher. — Allied to these, but having the tail shorter than the wing and nearly even, is the Sage Thrasher, or Mountain Mockingbird (*Oroscoptes montanus*), which inhabits the great sage-brush plains of the western United States, chiefly within the Great Basin, retiring to Mexico in winter. It is between eight and nine inches long, brownish gray above, the wings with two narrow white bands and whitish heavily streaked with dusky below. It is very terrestrial in its habits, running gracefully on the ground much after the manner of the American Robin, or frequenting the low sage-brush, upon the summit of which the males usually mount to sing. The song is not by any means the equal of that of the Mockingbirds, having much of the quality of that of the Brown Thrasher, or Catbird, though it is weaker, "more varied and longer sustained as well as superior in sweetness and delicacy of tone." They build a large bulky nest of sticks, strips of bark, rootlets, etc., artfully concealed in thick sage-bushes, and lay from three to five greenish blue eggs which are thickly spotted with brown.

Catbird. — Like the last the Catbird (*Galeoscoptes carolinensis*) is the sole tenant of its genus, and is an abundant and familiar summer visitor throughout the eastern United States, journeying in winter to Cuba and Central America. The vernacular name is derived from its mewing notes, which resemble more or less closely the cry of a domestic cat. Its plumage, too, is severely plain, being slaty gray with cap and tail black and under tail-coverts reddish chestnut; in fact, as Dr. Coues is pleased to put it, the Catbird represents the dead level of bird life, "inseparable from home and homely things; he reflects, and is reflected, in domestic life." Yet to many therein lies his chief charm, for, if unmolested, he comes fearlessly and confidently about houses and lawns, gardens and orchards, and, Mr. Ridgway adds, "very incomplete an American orchard would seem without him." But there is among many, chiefly ignorant, people a decided prejudice against the Catbird, probably not so much on account of his occasionally stealing cherries as that his cat like notes are distinctly distasteful. He has, however, a distinctive and really very sweet song of his own in addition to harsh discordant notes and crude imitations of other birds.

The Catbird usually returns from the south in May, and in addition to orchards and gardens frequents bushy swamps, tangled thickets, and undergrowth along streams. It is rather weak on the wing, avoiding long flights over open spaces and flitting from bush to bush, keeping as much as possible in cover. Its food consists almost entirely of insects, which are mainly secured on the ground. The nest is a large, rather inartistic structure of twigs, grasses, and leaves, lined with rootlets, and is placed in a densely foliaged bush, hedge, or tangle, usually only three or four feet from the ground, and is easily discovered by the evident anxiety of the birds. The eggs, from three to five in number, are a rich bluish green. Usually two broods are reared in a season, and by the last of September or early October they all depart for their winter quarters.

Thrashers. — The remaining genus comprises only the Thrashers (*Toxostoma*, formerly *Harporhynchus*), of which nearly twenty forms are recognized. The word *Thrasher* or *Thrusher* as sometimes used is thought to be derived from *Thrush*, the corruption being perhaps a "comparative degree," since they are much larger than the true Thrushes, being in fact the largest of the American slender-billed oscinine birds. They are largely terrestrial, having long, stout tarsi and large feet, with short, much-rounded wings and large, rounded tails, while the bill is as long as, or much longer than, the head and more or less decurved. The coloration is principally reddish brown or brownish gray above and whitish or buffy below, usually with distinct but sometimes nearly obsolete darker spots or streaks; in length they range mainly between ten and twelve inches. Their center of distribution is in the southwestern United States, whence they spread southward through Mexico and westward to southern and Lower California, only a single species inhabiting the great area between the eastern base of the Rocky Mountains and the Atlantic. This eastern species, called the Brown Thrasher (*T. rufum*), is a well-known though not very familiar bird, being much oftener heard than seen. It prefers hedgerows, shrubby borders of upland woods, and thickets in dry fields, where it spends much of its time

on the ground amongst undergrowth searching through the fallen leaves for its food. It is an active, rather shy bird, ordinarily avoiding as much as possible the immediate haunts of man and resenting intrusion, though occasionally nesting in secluded gardens. The nest is concealed in the interior of dense thorn-bushes, hedges, thickets overgrown with wild grapevines, or rarely on the ground under low bushes; it is composed exteriorly of small branches, twigs, grass, and plant stems, etc., and lined with leaves, soft grasses, and rootlets. The four or five or rarely six eggs are bluish or greenish white, thickly sprinkled with minute rusty brown dots. Although usually so shy, when the male is singing he mounts to the summit of a tree and for hours together pours forth his sweet and powerful song. Of its quality Mr. Nehrling says: "It flows along like a clear, powerful stream, occasionally sinking into soft complaint as of longing, then changing suddenly and becoming louder, fuller, livelier, till the air fairly resounds with the bird's exultant joy. This song, most eager toward the end of May and the beginning of June, is indescribably charming and beautiful. It consists entirely of original notes, those of other birds never entering into its composition."

Crissal Thrasher. — Among the other forms we will only mention the Crissal Thrasher (*T. crissale*) of the southwest from western Texas to the Colorado Desert and California, a species easily distinguished by its slender and strongly curved bill, grayish brown color, and deep rufous or chestnut under tail-coverts. It inhabits by preference bushy places in the vicinity of watercourses in the lower valleys, but also the oak-clad foot-hills to an altitude of 5000 feet, and is highly terrestrial, running swiftly on the ground from one bush to the next, often jerking upward its long tail. It is omnivorous, insects constituting an important part of its food, but in season it is also partial to berries, wild grapes, and the fruits of a thorny species of haw (*Cratægus*). It builds a bulky nest of sticks and thorny twigs and lined with fine, withered grasses, stems of plants, and shredded inner bark, and usually places it in a low dense bush only three or four feet from the ground. The two to four eggs are pale greenish blue and unmarked. The Crissal Thrasher possesses, according to Dr. Mearns, a song of very "remarkable scope and sweetness, having the power of the Mocking-bird, and an evenness and perfect modulation which that bird may well envy. It is one of the few birds that truly sing. It is no warbler of pretty ditties, nor yet a medley singer like the eastern Thrasher or the Mockingbird, but discourses pure natural music from the top of the tallest bushes, where it perches with its tail hanging down, in precisely the same attitude as the Brown Thrasher of the east."

THE DIPPERS

(Family *Cinclidæ*)

Although the Dippers, or Water Ouzels, constitute among themselves a very well defined group of birds, their relationship to other groups is by no means so clear and their systematic position has given rise to considerable discussion

among ornithologists. By some they are regarded as being most closely allied to the Thrushes, by others to the Wrens, and it must be confessed that, as one of them is seen standing nervously on a projecting rock in the midst of a brawling mountain stream, its appearance and movements do suggest those of "a gigantic Wren." But more than forty years ago Professor Baird insisted on their intimate affinity with the Thrushes, and facts have recently come to light which seem to substantiate this view, since it is now known that the first plumage in certain Asiatic species is distinctly spotted, this Thrush like spotting, in conjunction with booted tarsi, rendering their claims of relationship apparently complete. As Dippers of the New World do not exhibit the spotted plumage, they are beyond serious question less ancient than the stock in which this feature still persists, and hence it is assumed with a great degree of certainty that the cradle of the group is in the great plateau and mountain region north of India, from which point they have spread east, west, and north. Dr. Stejneger in a recent entertaining account of these birds is of the opinion that "the origin and beginning of the dispersal of the Dippers took place not later than the dawn of the Tertiary." They are essentially birds of the cold, rushing mountain streams, in the boreal and arctic-alpine zones, and wherever these conditions prevail, provided the avenue has been open, they have gone. Westward they passed by way of Asia Minor into Europe and eventually reached the Atlas Mountains in northwestern Africa, while another branch reached the Pyrenees, the Alps, and Scandinavia. To the eastward they ranged over Siberia, crossed to Alaska by the land bridge which is supposed to have spanned Bering Sea, and thence by the great mountain systems which parallel the Pacific coast have reached their southernmost extension in the New World in northern Patagonia. If Dr. Stejneger's assumption be correct, this dispersal was going on through the entire Tertiary period, and changes in continental elevation have left them stranded here and there in these different parts of the world. They are, however, absent from the mountains of eastern North America.

The Dippers are compact, stout-bodied little birds, slightly smaller than the American Robin, though more plump, with very stout legs, short, rounded, very concave wings, and a very short tail which contains twelve feathers. The whole plumage, which is mainly plain gray or brownish in coloration, is very dense and close, for beneath the outer contour feathers there is a thick covering of down after the manner of water birds, and like them they are also provided with a large oil-gand. These features are of course in no manner an indication of kinship with water birds, but are simply an adaptation to their peculiar mode of life. As Coues has delightfully expressed it: "... It is one of the endless instances of nature's delight in paradoxes — her magical way of putting the same thing to the most diverse uses, with a touch of her cunning wand. Given a brawling brook, too small, clean, and cold to suit any of the water birds she has on hand, but just the thing for a kind of Thrush, if he can be made to understand it; when presto! *Cinclus*. The odd little bird puts on his water-proof diving apparatus, takes a 'header' from the nearest green, slippery rock, and likes it so well that he wonders why he never did it before."

The Dippers are comprised in a single genus (*Cinclus*), and upward of thirty species and subspecies or distinguishable geographic races; their long isolation in many widely separated parts of the world having resulted, as might be expected, in the production of more or less well marked forms. The Old World is much the richer, being the home of nearly four fifths of the forms, and it is probable that when exploration is more complete the number of recognizable races will be still further augmented. On the basis of the coloration of the young they are separable into two groups, in all of the Old World forms this plumage being more or less squamate or spotted; while in the New World forms the young are not spotted, but are more or less like the adults. The Old World forms are further separated into two groups, in the first of which the adults are nearly uniform fuscous, while in the second they are more or less white beneath. It is easy, also, to divide the New World species into two groups, the forms inhabiting North America being practically a uniform grayish, while those in South America have the coloration in vari-colored patches, with a conspicuous white patch on the under side of the wings. Of those inhabiting North and Central America, the original form appears to be the Mexican Dipper (*C. mexicanus*), which has the upper parts slate-color and the under parts slate-gray, while the head and neck are deep sepia-brown; it is confined to the mountains of Mexico and Guatemala. Hardly to be distinguished from this is the common American Dipper (*C. m. unicolor*), which differs in being slightly paler and with the head and neck grayish brown; this form ranges from northern Mexico to Alaska. The Costa Rican Dipper (*C. ardesiacus*) of the highlands of Costa Rica and Chiriqui is similar to the Mexican species, but is smaller, with the general color a lighter, clear gray and the head less brown.

Fig. 198. — English Water Ousel, *Cinclus britannicus.*

The American Dipper is present in suitable situations throughout the Rocky Mountains, where I have often met with them along the cold, rushing mountain streams in and about the Yellowstone National Park and in the high mountains of Colorado and Montana. They are never sociable birds, and it is rare to find more than two together, unless it be a family party of young with their parents. But they are universally energetic and hardy birds, as much at home amongst the floating ice and snow as when the breath of flowers is in the air. They are practically resident where found, though perforce, if the stream become entirely covered with ice, they may be forced to lower altitudes. The ordinary note is a rapid chatter, uttered mostly when suddenly surprised or alarmed, but in addition it has a very beautiful song, which Mr. Trippe says, "it utters very rarely. It selects the wildest, darkest ravines, and is very timid while singing. Its song is clear, sweet, and varied, more Wren-like than any other bird's song,

yet peculiarly its own, and only to be heard amongst the most romantic scenery, mingled with the music of the mountain torrents."

It used to be a marvel as to how the Dippers could get along so well under water. Without knowing anything about its habits, it would seem no more adapted to aquatic life than any Thrush or Wren. As a matter of fact, it stays beneath the water solely by means of its wings, in a word, as Coues says, it flies through the water, and moreover this "flight below the surface requires as continuous effort to keep down as ordinary aërial flight demands in order that a bird may stay up in the air." An interesting experiment was conducted many years ago by Dr. John Davy, to ascertain the specific gravity of the European Dipper. The bird's body alone, after the skin and feathers were removed, had a specific gravity of 1.200, while in its natural state, with the feathers on, it was only 0.724. "While under water few air bubbles escaped from its feathers, owing to their resisting wetting from the oil with which they are preened."

Hudson, speaking of the form (*C. britannicus*) inhabiting Great Britain, says: "The stream he attaches himself to must have quiet and comparatively deep pools, and the water must be clear to enable him to detect the larvæ of water-beetles, dragon-flies, and other aquatic insects, all of which have a protective coloring. He does not range up and down a stream, like the Kingfisher, to visit the various feeding places; he limits himself to a portion of it, in many cases not much more than a hundred yards in length, and explores the bottoms of the same pools from day to day. . . . In ascending a mountain stream such as these birds love, abounding in deep, quiet pools, with noisy cascades and shallow rapids, its bottom strewn with great fallen boulders partly submerged, the rocky banks overgrown with sheltering bushes and vines, when you disturb a Dipper he flies up stream a short distance, perhaps twenty yards, and alights on a boulder, silent and motionless, until, disturbed again, he takes a second short flight up stream, and so to the limit of his range, whereupon, rising up and doubling back, he flies to the spot he started from." The whole stream may be parceled out among several couples, each keeping to their own chosen territory.

The Dippers nest rather early and build a large, bulky, domed nest, often a foot or more in diameter, with a small opening in one side. It is composed mainly of mosses, and is lined with fine rootlets, grasses, etc., the moss composing the bulk of the nest being kept wet by the dashing spray or by the birds themselves, in order, apparently, to keep it in a fresh and growing condition, although it is dry and warm within. Two nests which I found on a branch of the Gallatin River, Montana, were placed in niches in perpendicular walls, at the base of which ran the mountain stream. Dr. Merriam speaks of a nest he found near Mystic Lake, Montana, that was placed in a recess behind a small waterfall, through which the birds had to pass in going and coming from the nest.

The Dippers lay four to six pure white and unspotted eggs, which in size are about one inch by seven tenths of an inch.

THE WRENS

(Family *Troglodytidæ*)

As at present limited the Wrens comprise a compact and fairly well circumscribed group of very small to medium-sized birds, finding their closest relatives among the Mockingbirds (*Mimidæ*) and Creepers (*Certhiidæ*), especially the former, which have by some authorities been included with them. Technically speaking they are ten-primaried, acutiplantar oscines, or singing birds, with short, much-rounded, and concave wings in which the eighth to fourth primaries are longest, and elongated and compressed, usually slender bills which are, as a rule, more or less decurved toward the tip, while the rictal bristles are nearly obsolete, and the anterior toes show a considerable degree of cohesion at their bases. The tail is usually short and graduated, sometimes minute, though considerably elongated in certain South and Central American forms, and is without any special attributes, "unless the erected position so frequently observed may be considered a characteristic." As regards coloration, the Wrens are all plain birds, the prevailing hues being brown or gray, usually varied with bars of dusky, sometimes streaked or speckled, while the under parts are white, gray, buff, tawny, rufous, or sooty, and the plumage never has red, yellow, green, or blue, or other pure colors. The habits and general economy of the birds vary to such a degree that only a few leading traits can be conveniently enumerated, and on these points we quote from the most charming of writers, Dr. Coues. "The Wrens," he says, "habitually live near the ground, inhabiting shrubbery rather than trees, the reeds of swamps or marshes, the tangle of windfall country, patches of cactus, piles of rock, etc. Although not all scansorial in the proper sense, they have a good deal of the Creeper in their composition, and are incessantly rustling about in the intricate recesses of their chosen resorts, gliding with short flights or leaping impetuously. Such humility and the evident desire for a means of ready concealment, even though not always taken advantage of, contrast curiously with some other traits the Wrens exhibit in an exaggerated degree, and result in a singular compound. For the Wrens possess a high rate of irritability: they are bold, self-asserting, and aggressive, petulant to the verge of fretfulness, with a certain pertness of demeanor and a singularly prying, inquisitive disposition. They are the irresponsible busy-bodies of feathered society, and not seldom make trouble among some of the milder-mannered and better-behaved members of the sylvan circle. They are noisy birds; when alarmed or displeased, they have a loud, harsh, chattering, or scolding note; but they are also fine songsters." In the matter of nidification there is quite a wide range, yet in general it may be said that the Wrens build rather rude and bulky nests of coarse materials, placing them usually in cavities in trees, among rocks, or about buildings, sometimes hanging them in bushes or among reeds. There is no constant character of the eggs beyond the fact that they are always numerous, usually from six to ten. As regards food,

the Wrens are mainly insectivorous, though they occasionally eat worms, crustaceans, small mollusks, and seeds.

The Wrens are a numerous contingent, comprising more than two hundred and fifty species and subspecies disposed among twenty odd genera. They have their center of distribution in the tropical regions of America, whence they range as far north as Labrador and Alaska and south to Patagonia; while in the Old World they are but poorly represented, not more than half a dozen genera and thirty forms finding a home there, and these mainly restricted to Europe and the temperate parts of Asia, chiefly the latter. Inasmuch as nearly half of the genera are of large size, embracing from fifteen to forty forms, it will be only necessary to select a few which may adequately serve as representatives of the others.

Cactus Wrens. — Passing over the small South American genus of large so-called Brown Wrens (*Cinnicerthia*), in which the length of the tail greatly exceeds that of the wing, we may first consider the large group of Cactus Wrens (*Heleodytes*), which range from the southwestern border of the United States and Lower California throughout Central and South America to Brazil and Bolivia. These are the largest of the Wrens, some of them attaining a length of over eight inches; most of the species are very much spotted, streaked, and barred both above and below. Of these the Brown-headed Cactus Wren (*H. brunneicapillus*) ranges through central Mexico, and in two geographical races into the southwestern United States, extending as far north as southwestern Utah. It frequents the most arid and desolate regions of this country, where, as its name suggests, it finds a congenial retreat amidst the impenetrable cactus thickets and other dense undergrowth, now skulking from sight, now mounting to the tops of the bushes, "to scold in a loud, harsh tone, or to utter the notes of its clear and ringing song." It is very abundant in suitable situations and constructs, after the manner of its kind, a very bulky purse-shaped nest placed at a low elevation in cacti and in a horizontal position, with the small entrance at one side; it is composed of sticks, thorny twigs, grasses, etc., and lined with feathers. The eggs, four to six in number, are creamy white, very thickly dotted with reddish brown; two or three broods of young are reared in a year.

Rock Wrens. — Omitting a large genus of rather slender-billed tropical American Wrens (*Thryophilus*), mention may be made of the Rock Wrens (*Salpinctes*), so called from their frequenting rocks among which they skulk and hide. Of the five or six forms the best-known is the true Rock Wren (*S. obsoletus*) of the western United States, where it sometimes reaches to an altitude of 12,000 feet. About six inches long, it is pale grayish brown, minutely dotted with blackish and whitish above and soiled white obscurely streaked with dusky below. "It is a constant resident of the piles of loose rock which lie scattered on the mountain side, in which it finds its food and rears its young, and to which it retreats for safety on being alarmed." It builds a bulky nest of sticks, grasses, moss, hair, wool, etc., placing it in a crevice among rocks or some similar situation, and lays from four to eight pure white eggs which are thickly specked with dark brown.

Canyon Wren.—A frequent companion of the last, but partial to the deep, rocky canyons of the Great Basin and Rocky Mountain regions, is the Canyon Wren (*Catherpes mexicanus conspersus*), well called for its fondness for the wildest of rocky fastnesses, where it pours forth its wonderful ringing, flute-like song, like a "curious little animated music box," as Dr. Coues calls it. It nests in crevices or caves among rocks, building a nest not unlike that of the last-mentioned species, and laying from three to six white, brown-blotched eggs.

The **Carolina Wren** (*Thryothorus ludovicianus*) of the eastern United States is the sole representative of its genus, though a genus closely allied but distinguished by having a much more rounded wing (*Pheugopedius*), of more than forty forms, spreads throughout Central America and South America to Brazil and Bolivia. It is about five and a half inches long, rufous-brown above, with a white line over the eye, a black barred tail, and buffy or ochraceous below. Ever wild and untamed, the Carolina Wren mostly shuns the haunts of man and makes his home in the undergrowth near streams, where he dodges in and out among brush heaps, fallen tree-tops, and rocky places in the woods, now appearing on this side, now an instant later on that, scolding or giving voice to a great variety of musical trills in endless change. The most common song is a clear, loud, ringing metallic repetition of the syllables *tea-kettle, tea-kettle, tea-kettle,* or *whee-udel, whee-udel, whee-udel.* It is the only bird of the eastern United States that sings regularly throughout the winter, when its song is quite as loud and exuberant as in the breeding season. The bulky nest is composed of grasses, hair, feathers, and the like; it is placed in holes in stumps, crevices about buildings, etc. The four to six eggs are white profusely speckled with reddish brown and lavender.

Bewick's Wren.—Very closely related to this genus are the Wrens of the genus *Thryomanes*, separated chiefly on account of the relatively much longer tail and other minor structural characters, and having the tail-feathers, with the exception of the middle pair, chiefly plain blackish instead of being barred. Of these Bewick's Wren (*T. bewickii*) of the eastern United States is best known, being much more of a "house bird" than the Carolina Wren, coming about the gardens, barns, and outbuildings, and pouring forth his clear, bold song from the top of the house. The remaining fifteen or more species and subspecies of the genus are found in the western United States and Mexico.

The **House Wren** (*Troglodytes aëdon*) is a familiar and much-esteemed bird of eastern North America from southern Canada to the Gulf, and is the typical member of another large genus (*Troglodytes*) which spreads over practically the whole of North and South America. Too familiar to need extended description, it is one of the birds most eagerly watched for in spring, coming fearlessly about houses and grounds, where for nesting site it appropriates a bird box, an old crook-neck squash put out for his accommodation, a crevice in a building, or when there are not enough of these to go around, perforce of circumstances they take up with a hole in a tree. The nest is made of small twigs and lined with fine grass, feathers, etc., and the eggs number from five to nine, being white but so profusely dotted as to appear nearly uniform salmon-color. Two

or three broods are often reared in a season. Similar in appearance, but with a relatively shorter tail and very different habits, is the Winter Wren (*Nannus hiemalis*), which summers mainly from the northern border of the United States northward, and winters considerably to the southward. It frequents swamps, woods, and tangled undergrowth, darting in and out of brush piles, stone walls, etc., and has an astonishingly loud ringing song, of which Florence Merriam Bailey says, "Full of trills, runs, and grace notes, it is a tinkling, rippling roundelay."

American Marsh Wrens. – The only other New World forms that there is space to mention are the active little Marsh Wrens (*Cistothorus* and *Telmatodytes*), of which there are a dozen forms. They are of diminutive size, brown above, with the back streaked with black and white and the lower parts whitish or buffy. They frequent marshes, where among the tangled reeds and cat-tails they find congenial shelter, building a globular nest of grasses, etc., with an entrance on one side, attached to reeds and bushes or in tussocks of grass; the eggs are five to nine in number, pure white, or white more or less densely specked with lavender or brown. The Short-billed Marsh Wren (*C. stellaris*) has the bill much shorter than the head, while the Long-billed form (*T. palustris*) has the bill as long as the head.

European Wren. – Of the Old World species we may mention the European Wren (*Nannus troglodytes*) of northern and central Europe, which belongs to the same genus as our Winter Wren (*N. hiemalis*) and is not greatly different. This charming little bird is a great favorite with the English people, frequenting gardens, orchards, deep woods, open commons, hedgerows, rocky shores, swamps, mountains, and in fact all situations are alike congenial. It is a resident throughout the year in the British Islands, and sings as blithely in cold as in warm weather, its song being, as Mr. Hudson says, "a loud, bright lyric, the fine, clear, high-pitched notes and trills issuing in a continuous rapid stream." Other related species range through eastern Siberia, central Asia, Japan, China, etc.

Two other genera of Old World Wrens are worthy of brief mention, — *Urocichla*, which possess a tail of only ten feathers instead of the normal number of twelve (the three forms are confined to India), and *Pnœpyga*, in which there are but six tail-feathers, and these so short as to be entirely concealed from view by the long and ample rump-feathers; the five forms range from the Himalayas to Java and Sumatra.

THE WREN-TITS

(Family *Chamæidæ*)

But for the fact that this is the only family of land birds inhabiting the entire Nearctic region, its members would hardly be worthy of mention. It comprises only a single genus (*Chamæa*) with one species and two or three geographical races, all occurring within the state of California. They are small

Wren- or Tit-like birds, about six and a half inches in length, with the plumage very lax as in the Tits, the colors being plain brownish above, the long, graduated tail usually showing faint dark bars and cinnamon or buffy below, with the throat and breast usually streaked with darker. Structurally they possess a compressed, short, somewhat conical, unnotched bill, linear nostrils, well-defined rictal bristles, and short, concave, and rounded wings in which there are ten primaries. They have been included with both Wrens (*Troglodytidæ*) and Tits (*Paridæ*), and while distinctly different from either they probably find their closest relationship with the latter, especially the Bush-Tits (*Psaltriparus*).

The Wren-Tits are rather shy birds, frequenting the dense chaparral and tangled undergrowth, especially along mountain sides and foot-hills, into which they disappear on the slightest indication of danger. While flitting about and seeking their food the long tail is usually held up after the manner of Wrens, and as they fly their tails tilt up and down. When they scold, as they frequently do, the notes are loud and decidedly Wren-like; but one of the most striking things about them is their song, this according to Mr. Chapman being "wooden and unmusical, beginning deliberately and ending in a roll, *chick, chick, chick, chick-chick-chick-chick-chick-chick*"; but Mrs. Florence Merriam Bailey, who has had opportunity of studying them in the field, speaks of the "clear, ringing voice running down the scale, the bell-like tones now coming from the chaparral of the valley, now from the boulder-strewn hillsides above." Although there are a number of variations, the commoner song has nine notes, the last five running down the scale, whence the bird is often called the Scale-bird. The nest, a compact structure of twigs, straws, strips of bark, feathers, etc., is placed in a bush in a dense thicket and usually between one and four feet from the ground. The three to five eggs are greenish blue and unspotted.

THE OLD WORLD WARBLERS

(Family *Sylviidæ*)

It is necessary to designate the members of this group as the True or Old World Warblers to distinguish them sharply from the American or Wood Warblers (*Mniotiltidæ*), with which they have little or no intimate relationship, being "ten-primaried" instead of "nine-primaried," as are the latter. The family *Sylviidæ* is a very large one, comprising some seventy-five genera and between five and six hundred species, all being birds of small size, and, with few exceptions, of plain plumage. The sexes are alike in coloration, except in a few genera, and even here the differences are slight, but curiously enough the young, while having the same color pattern as the adults, are more highly colored. They have a partial or complete spring moult, but it appears that the young do not assume the full adult plumage until the second autumn. Structurally they have a rather slender bill, both mandibles of which have the edges smooth or sometimes the upper one possesses a single simple notch, while the tarsus

is smooth in front, being composed of only two entire longitudinal plates (booted); the nostrils are clear of the line of the forhead, the tongue non-tubular, and the wings comparatively short and broad; the tail contains ten or twelve feathers. While some of the Warblers are quite sedentary and seem, indeed, incapable of protracted flight, the majority of them are highly migratory, certain of them extending their migrations far and wide. Thus the Barred Warbler (*Sylvia nisoria*) is found in summer from southern Sweden east to the Ural and south to the Rhine and in winter in central Africa, and the Siberian Whitethroat (*S. affinis*) occurs in western Siberia, north almost to the limit of trees, and winters in India and Ceylon. The *Sylviidæ* are mainly insectivorous, but they also subsist on minute mollusks and to a limited extent on fruit. They frequent a great variety of situations, such as groves, fields, reedy marshes, and rice fields, while some spend much time on the ground or skulking through grassy or bushy cover. Their notes are also of great variety, some possessing a very clear and sweet though often plaintive song, others, as the Willow Warblers, a decided trill, others a rather shrill whistle, while still others, as the Grasshopper Warblers, "have a peculiar cricket-like note." Of their nesting habits we will try to give some exposition in the following accounts of such typical members as may be selected for notice, but with so great a number of species it will only be possible to choose a few of the better known or more interesting.

The **Grasshopper Warblers** (*Locustella*), of which there are nine species, take their name, as suggested above, from their peculiar notes, which are neither song-like nor even bird-like, but resemble the monotonous stridulation of some insect. They are very shy, wary birds, frequenting reed beds, thorny thickets, and wet cover of all sorts, and rarely exposing themselves to view. They have a soft plumage mostly of russet-brown coloration, an exceedingly short outer primary, and a very much rounded tail. One of the best-known species is the European Grasshopper Warbler (*L. nævia*) of northern, central, and southern Europe, whence it extends to central Asia, wintering in North Africa. It is found though somewhat locally in suitable situations throughout the British Islands, arriving from the south about the middle of April and frequenting bush-covered localities in both swampy and dry places. It is extremely shy and not often seen, but may be recognized by its continually repeated notes, which are often heard at night as well. It feeds on insects of various kinds, which it seeks amongst the foliage of bushes or secures on the wing. The nest, a deeply cup-shaped affair of grasses, mosses, etc., is placed on the ground and carefully concealed among grasses or tangled bushes; the five to seven eggs are rosy white spotted with reddish brown.

Reed Warblers. — Closely allied to these, but having a much less rounded tail, are the Reed Warblers (*Acrocephalus*), of which upward of thirty species are known. They are plain olive-brown or russet-brown plumaged birds, of very shy disposition, frequenting reed beds, marshes, and wet situations generally, concealing themselves in the densest tangle of vegetation on the slightest attempt to observe them. Their ordinary notes are rather harsh and querulous, but during the nesting season many of them have quite a sweet and very persistently

repeated song. Of these, the Sedge Warbler (*A. phragmitis*) is a very well known species, ranging over Europe and Asia as far north as the Yenisei and spending the winter in Africa; it is a common and well-known bird in England, being found where there are reed beds, willows, and bushy places near watercourses. It is very active and rapid in its movements, and although not exactly shy, it is hard to observe on account of its restlessness. "It breeds in May in dense patches of aquatic herbage, and its nest, which is fastened to the dense-growing stems of aquatic plants, is constructed of dry stems of grasses, fine rootlets, and often a little moss, and is lined with fine bents, horsehair, feathers, and sometimes wool; its four to six eggs are pale yellowish brown or warm buff, closely dotted with dark brown." — DRESSER.

Bush Warblers. — Much less migratory are the so-called Bush Warblers (*Tribura*), of which there are five Indian species and a number of others in Africa and eastern Asia. They are all birds of plain plumage and have the feathers especially soft and silky in texture. They frequent paddy-fields, stubble, and places where there is abundant ground cover, and feed much upon the ground.

Tailor-birds. — Not widely separated from the last are the celebrated Tailor-birds, of which there are at least two genera (*Sutoria* and *Orthotomus*) and some seventeen species, which range from India, Ceylon, and the Burmese countries through the Malay Peninsula to the Philippines. More brightly colored than any of the Warblers thus far considered, the Tailor-birds are chiefly remarkable for the skill they display in the construction of their nest, this being a delicate little receptacle formed by sewing the edges of a leaf, or sometimes two leaves, together with plant fibers, the nest proper consisting of plant down, hair, fine grass, etc. In the Indian Tailor-bird (*Sutoria sutoria*) the length of the bird is about five inches, but in summer the male acquires very much lengthened middle tail-feathers, which increase its length by some two and a half inches; the plumage is mainly yellowish green above and dull

FIG. 199. — Indian Tailor-bird, *Sutoria sutoria*.

white below, the forehead and part of the crown being rufous. These birds, according to Mr. Oates, frequent well-wooded tracts, low jungles, and gardens, going about singly or in pairs and having a remarkably loud note for their size. The three or four eggs laid by this species vary from reddish white to bluish green, boldly marked with brownish red.

Fan-tailed Warblers. — In another large genus of more than fifty species, the members of which are known as Fan tailed Warblers (*Cisticola*), the tail is shaped like a perfect fan, and there is in many of them a seasonal change in plumage which also affects the length of the tail, this being much shorter in summer than in winter. The Fan tailed Warblers are not swamp loving in their habits, but are found in grain fields and grass land, and secure much of their food on the ground; many of them, for example the Rufous Fan tail (*C. cursitans*) of India and Ceylon, have a sharp, clear note mostly uttered while the bird is soaring in the air, which it frequently does. This species builds a tubular nest in a clump of grass, attaching it to the stems, and lays four or five white or greenish eggs which are spotted with reddish brown and purple.

Whitethroat, Blackcap, etc. — Passing over a number of forms such as the Wren-Warblers (*Franklinia*), Grass Warblers (*Graminicola*), Tree Warblers (*Hypolais*), etc., which do not exhibit special interest, we may notice some of the more typical members of the family. The Whitethroat (*Sylvia sylvia*), perhaps the best-known species of this genus, is one of the commonest and best-known of the smaller summer visitors throughout Europe, being especially abundant and esteemed in the British Islands. About five and a half inches long, it has the upper parts reddish brown and the lower parts white faintly tinged with rose-color. It attracts the attention of the passer-by, not so much by its song, which is short and somewhat monotonous, as by its eccentric actions. "The intruder," says Mr. Hudson, "is received with a startled, grating note, a sound expressive of surprise and displeasure, and, repeating this from time to time, the bird flits on before him, concealed from sight by the dense tangle he moves amidst. Presently, if not too much alarmed, he mounts to a twig on the summit of the hedge to pour out his song, a torrent of notes, uttered apparently in great excitement, with crest raised, the throat puffed out, and many odd gestures and motions. Sometimes he springs from his perch as if lifted by sheer rapture into the air, and ascends, singing in a spiral, then drops swiftly back to his perch again." The Whitethroat's nest is a slight structure of plant stems and grasses and lined with horse-hair, placed in a low bush or bramble two or three feet above the ground; the four to six eggs are greenish white speckled with olive and sometimes marbled with gray and brown. Other more or less well known species of the genus are the Blackcap (*S. atricapilla*), the Garden Warbler (*S. hortensis*), etc.

Willow Warblers. — Although referred to several genera, the Willow Warblers are best exemplified in *Phylloscopus*, in which the bill is small and narrow and the nostrils not overhung with bristles, and in *Acanthopneuste*, which has a relatively larger bill with the nostrils nearly concealed with bristles. The Willow Warblers are mainly olive-brown or olive-green above, and frequent

trees and bushes, especially willows along streams, among the branches of which they search for insects, "frequently launching out after the winged ones in the manner of a Flycatcher." They are in the main highly migratory, spending the summer in the high north or in the lofty ranges of the Himalayas and in winter retiring far to the south. The males of all, so far as known, possess a pleasing song during the nesting season, but at other times their notes are low and inconspicuous. They build a rather large, soft nest on the ground or in low trees and lay pure white eggs, or white spotted with reddish. A well-known species is the Chiffchaff (*Phylloscopus minor*) of Europe from the Canaries

FIG. 200. — Pallas's Willow Warbler, *Phylloscopus proregulus*.

and the Volga north to the Arctic Circle, and a common bird in the British Islands. It arrives very early in the spring from its African winter home and throughout the season its pleasant though monotonous song of *chiff-chaff, chiffy-chaffy*, is to be heard in woods and groves. It is active in its movements and quite swift on the wing, now and then launching out to capture gnats and flies, or searching for insects amidst the foliage. It builds a semi-dome-shaped nest on or near the ground, constructing it of grasses, dry leaves, and moss, and lining it with feathers, plant down, etc. A little larger and more brightly olive-green above is the so-called Willow Wren (*P. trochilus*), a confiding and exceedingly sweet songster of Europe generally. Our illustration is that of Pallas's Willow Warbler (*P. proregulus*) of Asia from the Lena to Lake Baikal and south to the Himalayas. It frequents pine and birch woods and brushy valleys, and in habits is said to resemble the Goldcrest (*Regulus regulus*). Kennicott's or the Alaskan Willow Warbler (*Acanthopneuste borealis kennicotti*), the parent form of which occurs in northern and eastern Asia, is chiefly remarkable from

the fact that it is the only form that has extended its range into the New World, the subspecies now occurring in the Commander Islands and western Alaska, where Osgood found it with young; it is about five inches long, olive-green above, and white tinged with yellowish below, while there is a broad whitish line over the eye and two narrow whitish wing-bars.

Wren-Warblers.—The final group that space will admit of mention is that of the Wren-Warblers (*Prinia*), of which there are nearly a dozen and a half species ranging from South Africa through the Indian peninsula to Java and Ceylon. They are brownish or greenish little Wren like birds, frequenting swamps, banks of rivers, low, inundated grassy plains, etc., and constructing very neat oval or purse shaped nests, with the entrance on one side near the top.

American Gnatcatchers.—The propriety of placing the American Gnatcatchers (*Polioptila*) with this family has been seriously questioned, some preferring to refer them to the Flycatchers (*Muscicapidæ*), and others to the Mockingbirds (*Mimidæ*); but it seems, as Mr. Ridgway points out, that they must either be made a subfamily of the *Sylviidæ* or given full family rank. They are small Flycatcher-like birds, about five inches long, with a slender depressed bill, large wholly exposed nostrils and well-developed rictal bristles, the wings being rather short and rounded and the tarsus long and slender. The coloration is plain gray or bluish gray above and white or pale gray beneath, the tail being black with the outer feathers more or less white-edged; the females are duller in color but otherwise nearly identical with the males. There are about twenty species and subspecies inhabiting the tropical and warm temperate portions of continental America (one species being peculiar to Cuba), with a few forms occurring in the warmer portions of the United States, among them the Blue-gray Gnatcatcher (*P. cærulea*) of the Eastern States. They are excessively active, industrious little birds, frequenting usually the topmost branches of the tallest trees, "skipping nimbly from twig to twig, with lowering half-spread wings and nervous twitchings of the whole body, in eager quest of insects and larvæ, now pausing a moment to pry more closely into a suspected crevice of the bark, then darting into the air to capture a passing fly, and regaining their perch after almost a somersault." This species is abundant near Washington, D.C., where their shrill, noisy notes, like *tzee-tzee-tzee*, may be heard in early April; but a few weeks later the sharp accents are modulated into a low, sweet, faultlessly executed song. Their nests are exquisite examples of bird architecture, being very deeply cup-shaped structures composed of strips of soft bark, thistledown, and the like, stuccoed outside with lichens, and firmly fastened in a crotch or on a branch, usually at a considerable height from the ground. The four to five eggs are bluish white thickly spotted with brown. A subspecies of the above, known as the Western Gnatcatcher (*P. c. obscura*), occurs from western Texas to California and Lower California; it is slightly grayer above and has less white on the tips of the tail-feathers. With nearly the same range is the Plumbeous Gnatcatcher (*P. plumbea*), which may be known by its shining black crown and blacker tail. Its habits are like those of the Eastern form, but its eggs are pale greenish blue spotted with reddish brown.

THE KINGLETS

(Family *Regulidæ*)

The diminutive Kinglets, or Goldcrests, which are typically represented by a single genus (*Regulus*), have been banded about not a little as regards their systematic standing, and even now it can hardly be claimed that their position and rank are finally fixed. Usually regarded as a subfamily of the *Sylviidæ*, or Old World Warblers, they have also been given by some authorities a similar position under the *Paridæ*, or Titmice, while Dr. Sharpe divorces them entirely from these groups and gives them full family rank between the Wren-Tits (*Chamæidæ*) and Nuthatches (*Sittidæ*). Whatever the final pronouncement, it is certain that they are as much entitled to family rank as are many of the other so-called "families" of the *Oscines*.

The Kinglets are dainty little birds between three and four inches long, with the soft lax plumage of the Tits, and are spread over the entire Nearctic and Palæarctic regions, breeding far to the northward or high up in the mountains. They have a short, straight, slender, slightly notched bill, oval nostrils, which are covered by a single peculiarly shaped feather or a small tuft of feathers, sparse rictal bristles, and rounded wings which are longer than the emarginate tail. In color the plumage is plain olive-green or olive-grayish above, the wings with two narrow white bands, and dull whitish more or less tinged with olive or dull yellowish below; the crown is usually orange, yellow, or red centrally, whence the appropriate name of Goldcrests. They are very active and energetic, yet withal tame and confiding little birds, going about in parties and consorting with Warblers, Titmice, and Creepers, and like them seeking their food of insects among the branches of trees and shrubbery. They frequent especially coniferous trees, and there is no more pretty sight than an industrious swarm of these bright-capped musical little midgets gleaning amidst the dark green branches. While not all are equally endowed with remarkable voices, certain ones are particularly favored, such for example as the North American Rûby-crown (*R. calendula*). "It is really surprising," says Dr. Coues, "that such a tiny creature should be capable of the strong and sustained notes it utters when in full song. The lower larynx, the sound-producing organ, is not much bigger than a good-sized pin's head, and the muscles that move it are almost microscopic shreds of flesh. The Kinglet's exquisite vocalization defies description; we can only speak, in general terms, of the power, purity, and volume of the notes, their faultless modulation, and long continuance." Aubudon, too, was much impressed with it, saying that "its song is fully as sonorous as that of the Canary-bird, and much richer, being powerful and clear, but much more varied and pleasing."

The nests of the Kinglets are exquisite examples of bird architecture, being large, round structures made of green moss, strips of bark, and fine rootlets, thickly and warmly lined with soft feathers; these are usually placed in forks or partially suspended among the branches of spruce trees, usually high above

the ground. The eggs, numbering from five to ten, are dull whitish or grayish, finely speckled or sprinkled with brown or lilac; when the larger number of eggs is present, they are usually found in two layers, the nest being otherwise too small to hold them.

The genus *Regulus* comprises some seven or eight species and an equal number of geographical races, one of the best known North American forms being the Golden-crowned Kinglet (*R. satrapa*) of the eastern and northern portions of the country, its place being taken on the northwest coast by the Western Golden-crown (*R. s. olivaceus*). In these the male has the crown patch rich orange, bordered with yellow, while in the female it is wholly yellow, both sexes having a broad black stripe on each side of the crown. They are very rugged little birds for which the winter has no terrors. Similar to this, but the male with a crown patch of scarlet-vermilion and no black on the head, is the Ruby-crown (*R. calendula*), which ranges throughout practically the whole of North America. Of the Old World species, the Goldcrest, or Golden-crested Wren (*R. regulus*), occurs in Europe and northern Asia, with geographical races in the Azores, Canaries, Himalayas, and Japan, and the Firecrest (*R. ignicapillus*) in temperate Europe, Asia Minor, and northern Africa, while what is perhaps the most beautiful member of the genus is the exquisite little Goodfellow's Firecrest (*R. goodfellowi*), recently discovered in the high mountains of Formosa. It is similar to *R. ignicapillus*, but differs in the more brilliant fiery orange-red of the crown, the more distinct black-and-white markings on the sides of the head, and the canary-yellow lower back and rump.

Dr. Sharpe has placed in this family three other small genera of Asiatic Tit-like birds, but they are of no particular interest.

THE SWALLOWS

(Family *Hirundinidæ*)

Perhaps we of the Northern Hemisphere have been dimly conscious of a void in our bird world without quite realizing what has caused it, when suddenly we hear the familiar twittering and note the graceful evolutions — and then we know the Swallows have come. One Swallow may not make a summer, as the old adage has it, but then, as a matter of fact, they rarely come singly but in troops of full strength, and we may then be assured that the rigors of winter and the uncertain days of early spring have given place to the real promise of summer. Only rarely are the Swallows lured on to their summer home by mild weather, to find suddenly that summer has not really come. They may then disappear again for a day or two, or if the fall in temperature has been sudden, they may be found numbed or even lifeless in their last year's homes or in out-of-the-way places. Cold they cannot endure, and to avoid it they often make journeys of hundreds or even thousands of miles.

In structure and appearance, Swallows are very uniform, and consequently

they constitute a very well — perhaps the best — defined group of oscinine birds, being apparently without any very close relatives. To the uninitiated the Swallows are not differentiated from the Swifts, but, as set forth under that group, they are not at all closely related, not even belonging to the same order. They are small birds, sufficiently characterized by their long, pointed, "nine-primaried" wings, very short, flat, triangular, deeply cleft bills, and more or less emarginated or forked tails of twelve feathers (the Swifts possess but ten), while the tarsi are short and the feet weak and fitted only for perching. The plumage is compact and is usually lustrous or semi-metallic, at least on the upper parts, though sometimes dull colored throughout; there is but a single annual moult, which takes place usually, at least, in autumn or winter. The sexes are mainly alike. Swallows are preëminently insectivorous, feeding almost entirely on flying insects which they capture on the wing, though some species feed on berries of various sorts when their favorite insect food temporarily fails them, owing to sudden or unseasonable changes of weather. During clear days they may usually be seen pursuing their prey some hundreds of feet up in the air, but in damp or rainy weather they often find their food supply only a few feet above the surface of the earth. On the ground, which they rarely visit, they are particularly awkward, but on the wing they are gracefulness personified, seeming never to tire and making their wide circles and curves with little apparent effort. Dr. Coues, than whom there is no more elegant writer on our birds, has the following to say on the flight of Swallows: "The motion of the Swallow skimming the ground, and 'quartering' in zigzag after its prey, has been aptly compared to the coursing of the greyhound. No one who has attentively watched the flight of Swallows can have failed to notice their peculiar 'towering,' when they rise abruptly with a few vigorous strokes, and seem to hang suspended for a moment, before falling with great velocity through a beautiful curve with half-gathered wings, and at such little loss of impetus by friction that they avail themselves of this peculiar line to rise nearly to their former level without muscular effort. Sometimes their course is straight as an arrow's, and only less swift; sometimes they hover and flutter at seeming random, and not the least marvelous of their feats is the spirited dash they make, with unerring aim, to enter the narrow belfry, and settle, as light as a feather, with joyous twittering on the nest."

Swallows are possessed of a considerable degree of intelligence, as the following account will show. For several years the writer had under observation a colony of the common Cliff or Eave Swallow. This was in a shed open on one side, the nests being attached to the sleepers of the loft above. Here the nests remained undisturbed, apparently the same birds returning to them year after year. One nest in particular remained intact for several seasons and always had a pair of occupants. Shortly after their return one spring the birds were observed to be walling up the entrance to this old nest. After their departure that fall the sealed nest was broken open and found to contain the desiccated remains of a Swallow. It appears that one of the owners of the nest had died and the others, recognizing the fact that it could not be used and would soon become offensive, had securely closed the entrance.

In this same colony a number of nests were in process of construction, and while watching them it was noticed that one particular bird did not make excursions to the near-by mud puddle, which supplied the building material, as did the others. This bird waited quietly until her neighbors had gone for fresh material, when she repaired to these half-finished structures, removed the last piece of mud they had put in place, and carefully molded it to her own nest. These tactics were observed again and again, and in no instance did the bird bring material for herself, nor did the others appear to notice the appropriation of their supply.

The nesting habits of Swallows are somewhat variable, a few placing their nests in hollows of various descriptions in no event excavated or prepared by the birds themselves, others digging burrows in banks of earth or sand, while the majority build rough stuccoed nests of moist clay or mud. The habits of a number have been modified or in some cases almost totally changed through their contact with man. The eggs usually number four or five, the color being pure white or white with a more or less profuse spotting of brownish.

The Swallows, comprising approximately twenty genera and over one hundred species, are practically cosmopolitan though more abundant in warmer countries, and the majority of them are highly migratory, often making journeys of vast distances, while others are resident, and a few are confined to relatively small areas, though for the most part they are wide-ranging. The family has been divided into two subfamilies, the first of which (*Hirundininæ*) comprises the majority of the group, and the second (*Psalidoprocninæ*) the Saw-winged Swallows of West and South Africa, and, according to Sharpe, the American Rough-winged Swallows, though Mr. Ridgway and others doubt the correctness of placing the last genus here, and I follow these latter authorities in keeping them with the typical Swallows.

Purple Martins. — The first genus to be considered includes the Purple Martins (*Progne*), the six species of which range over the whole of temperate and tropical America, including the West Indies and the Galapagos Islands. They are birds of large size for the group, with a stout, distinctly hooked bill and circular superior nostrils, the plumage in the adult males being a glossy blue-black above, some species being entirely of this color, while others have the under parts partly white. The best-known species is the common Purple Martin (*P. subis*), which has the under parts entirely dark steel-blue like the upper parts; the female is much duller and more sooty gray, and the young are similar. This bird occurs throughout temperate North America, except the Pacific coast district, where it is replaced by the lighter-colored Western Martin (*P. s. hesperia*), and nests as far north as Maine, New Brunswick, Manitoba, and Montana, though it is most abundant in the Southern States; it winters from southern Florida and Mexico to Venezuela and Brazil. In the Northern States, however, it is a comparatively rare bird of local distribution, and for some unexplained reason appears to have steadily decreased in numbers in recent years, though it is still common in the south. Originally the Purple Martin nested in hollow trees and crevices in rocks, and in the more western parts of its range still does

so to some extent, but in the east it has more readily adapted itself to civilization and is found rearing its young in bird houses, boxes, or dried gourds that may be provided by appreciative hands. "None of our Swallows," says Mr. Nehrling, "is so generally known nor such favorites as the Martin. Everywhere, from the Atlantic to the Pacific, this bird is known. It is abundantly present in villages and even in cities, and everywhere is a welcome favorite, whose coming is yearningly expected, joyfully greeted, and whose departure causes a pang of melancholy. None of our Swallows have attached themselves as intimately to the human family as these. All the other species are more pretentious in their claims and will breed only when the conditions are particularly favorable. The Martin is as well satisfied with the simple yellow gourd attached to a pole near a negro hut as with the most-ornamented and best arranged Martin house built in the beautiful gardens and parks of the rich. When no nesting boxes are provided in the east our Martin will not breed, and it hardly ever accepts nesting boxes attached to trees, preferring locations where the chance is given to dart in and out uninterrupted by any obstacles." They are often dispossessed of their houses by the despicable English Sparrow, and when once worsted in such an encounter rarely regain their lost ground. The nest proper is made of straws, twigs, feathers, etc., and the four to five eggs are pure white. In the north only a single brood is reared, but in the south there are usually two. The parents are very industrious in the care of their young, Mr. Widmann having watched a colony of sixteen pairs of birds from 4 A.M. to 8 P.M., during which time the old birds visited their offspring 3277 times, or an average of 205 times for each pair. During the nesting season Martins spend the night in their boxes, but after the first two or three days, when the young are able to be abroad, all leave the house and thereafter spend the night in dense thickets, to which they repair after dark and leave with the first appearance of dawn. All the birds of a district appear to congregate in the early morning in some dead tree or on the roofs of their nesting boxes before starting out for the day's foraging, and the same process is gone through with in the evening. Around these places they "swarm like bees for about half an hour, when the air for a mile around is filled with Martins, now forming a whirling body of many thousands, rolling up and down, going and returning in wide circles, but all the time drawing surreptitiously toward the willows on the other side of the river."

The **Caribbean Martin** (*P. dominicensis*) of the West Indies may be taken as an example of those in which the plumage is not uniform, being glossy steel-blue above and along the sides, but with the middle of the breast and abdomen pure white; the habits of this and of the other species are apparently similar to those of the Purple Martin.

South American Tree Martin. — Usually included with the last genus, but here separated on account of a weaker bill, more extensively feathered tarsus, and mouse-brown plumage, is the South American genus *Phæoprogne*, of which the Tree Martin (*P. tapera*) may be taken as an example. Slightly smaller than the Purple Martin but with greater extent of wing, the Tree Martin has the entire upper plumage dusky brown and the under surface white. It is

a common bird in many portions of South America, especially in Argentina, where it arrives in September. It is a garrulous bird, Mr. Hudson tells us, the male and female who come mated singing in concert and persistently. They are usually seen only in pairs and are never observed to alight on the ground or on the roofs of houses but always on trees. Their flight is peculiar and quite unlike that of their near relatives, and they never soar in circles. In Argentina they place their eggs only in the clay ovens of the Oven bird (*Furnarius rufus*), which they usually take up with after the owners have reared their young and left, but not infrequently the Martins desire possession before the Oven-birds are through, and conflict fierce and prolonged ensues. Sometimes the latter are able to hold their own, but most frequently they are dispossessed and the nest of the Martin made on top of their eggs and they perforce retire to spend a childless summer.

The **Cliff or Eave Swallow** (*Petrochelidon lunifrons*) of North America, as far north as the limit of trees, may be taken as typical of a genus of some dozen species which occurs also in Central and South America, as well as in Africa, Australia, and the Indian peninsula. They are small or medium-sized Swallows, with a very short bill, superior nostrils, and a short, nearly even or slightly emarginate tail, while the back is streaked with white and the rump bears a conspicuous patch of chestnut, cinnamon, or dull whitish. Too well known to need more extended description, the Eave Swallow is distributed though somewhat locally over practically the whole of North America in summer, retiring in winter to Central and South America. By some it is asserted that it is an immigrant of comparatively recent date throughout the eastern United States, as it did not begin to attract much attention until the early part of the last century, but as Dr. Coues has pointed out, "much of the testimony is merely indicative of the dates, when, in various parts of the country, the birds began to build under eaves, and so establish colonies where none existed before." Prior to the advent of white men this Swallow probably attached its retort-shaped nest of mud to the sides of cliffs, as it still does in many parts of the west; but, like its relative the Martin, it was quick to take advantage of the security afforded by human habitations, and now the nest is almost universally placed under the projecting eaves of barns and outbuildings, or occasionally under porches and verandas. In any event, they seem to have greatly increased during the last century, a prerequisite to the establishment of a colony being proximity to clayey mud. The birds may be seen along the bank of a stream or about a puddle in the road, securing a bill full of tenacious mud, which they work over in their bill and use in the construction of the quaint nest. Typically this is like the half of a retort or gourd with the neck pointing outward, and where they build on cliff-faces, hundreds of nests are often placed as close together as they will stick, thus gaining mutual support; but when under eaves they form a long, contiguous row and there seems to be a tendency to abandon the more elaborate structure of their ancestors, for many now make only a shallow platform of mud, dependence being placed in the overhanging roof to keep out the rain; all are warmly lined with grass or feathers. The four or five eggs are creamy white spotted with brown.

Australian Tree Martin. — Of the two Australian species referred to this genus, the Tree Martin (*P. nigricans*) has habits very different from our Eave Swallows in that it nests in the hollow limbs of trees or on the wall caps under the eaves of sheds and houses, not employing mud in the construction, while the little Fairy Martin (*P. ariel*) builds the typical bottle-shaped nests of clay, placing them singly or more often in clusters on the face of a cliff, a cavity in a tree, or under eaves of buildings or ledges.

American Rough-winged Swallows. — Probably belonging here are the Rough-winged Swallows (*Stelgidopteryx*), of which there are several species of warm temperate and tropical continental America. With many of the characters already mentioned for the foregoing forms, they are distinguished by the male having the outermost primary with the barbs of the outer web stiffened, "causing a file-like roughness when the finger is drawn along the edge of the quill from the base toward the tip." The color of the plumage is plain grayish brown above and paler grayish brown beneath, becoming white on the abdomen, some species having the throat cinnamon or buffy. The only North American species is the common Rough-winged Swallow (*S. serripennis*), which nests as far north as British Columbia, Minnesota, and Connecticut. They are of about the same size and have much the habits and appearance of the Bank Swallow, to be described next, and like this species they nest in holes and crevices, sometimes excavated by the birds themselves in banks, but usually they take up with something already at hand, such as an abandoned Kingfisher's burrow, a crevice in masonry, or, more rarely, chance holes in bridges or buildings. The nest itself is made of grasses, feathers, etc., and the complement of eggs ranges from four to eight; they are immaculate white.

Bank Swallow. — The little Sand Martin, or Bank Swallow (*Riparia riparia*), has, it is believed, the widest distribution of any land bird, ranging over nearly the entire Northern Hemisphere, occurring in North America in summer as far north as the limit of trees, and in winter throughout Central and northern South America, while in the Old World it spends the summer in Europe, northern Asia, and China, and the winter in Africa, the Indian peninsula, and the Indo-Burmese countries, and according to Mr. Ridgway, two other supposed species (*R. diluta* of central Asia and *R. shelleyi* of northeastern Africa) seem to be only desert forms or subspecies of it, thus further increasing the range. Throughout this vast area its habits and appearance are practically uniform, not having been modified by civilization, which, indeed, it rather avoids, though it has been reported as occasionally excavating its holes in huge piles of sawdust about sawmills. It is a plain little bird about five inches long, with the upper parts grayish brown and the lower parts white, with a band of grayish brown across the chest. It is a highly sociable and gregarious species, and great colonies resembling gigantic beehives are often met with, such as that observed in Alaska by Dr. Dall, who counted over seven hundred nest holes in the face of a single sand bluff. The nests are always placed in excavations made by themselves, usually in the sandy banks of rivers, bluffs along lakes or the sea, or sand and gravel pits, and generally near the surface of the ground, the birds showing

great foresight in selecting the most suitable soil to work in. The entrance is not circular but horizontally elliptical, and the hole may extend in for a distance varying from one to four feet, though about two feet is the usual distance. The nest proper, placed at the farther end of the burrow, is a slight affair of dried grasses and feathers; the four to six eggs are pure white. The half dozen other species usually referred to this genus (Mr. Ridgway does not consider them congeneric) appear to have habits similar to those described above.

Typical Swallows; Barn Swallow. — The largest and in some respects most typical genus is *Hirundo*, which comprises upward of forty species of generally familiar and well-known birds, practically all parts of the world being represented. They are small to rather large Swallows, with the nostrils opening laterally and overhung by an operculum, while the tail is usually long and forked for more than one-third of its length, though in a few otherwise typical forms it is shorter and but slightly forked. The plumage is mainly glossy blue-black or dark steel-blue above with a rufous patch on the forehead or rump or both, while the under parts are either "partly chestnut or rufous, whitish streaked with darker, or white with a black band across the chest." The only indigenous species of the genus in the New World is the American Barn Swallow (*H. erythrogastra*), the two West Indian species having recently been set aside by Mr. Ridgway as a new genus (*Lamprochelidon*). This bird is found throughout North America, breeding as far north as Greenland and Alaska and wintering in Central and South America, and is known at once by its deeply forked tail, dark steel-blue upper parts, and chestnut forehead, throat, and breast. It is the most generally distributed of our Swallows, there being hardly an old barn or shed without its pair or small colony, and there is no more graceful sight than a number of these birds on the wing as they skim low over the surface or rise as light as a feather, now turning this way, now that in their erratic course. The nest is an open cup-shaped structure composed of pellets of mud and attached usually to the rafters inside of buildings or occasionally on the face of a cliff. It is lined with soft grasses or more frequently feathers and contains four to six white, thickly spotted eggs.

FIG. 201. — American Barn Swallow, *Hirundo erythrogastra*.

European Barn Swallow. — Very closely related to the last, but distinguished by a broad band of glossy blue-black across the chest is the European Barn or Chimney Swallow (*H. rustica*), which occurs mainly throughout the Palæ-

arctic region, except the extreme eastern portion, migrating in winter to the Indo-Malayan and African regions. It is a very common and familiar bird in the British Islands, where it is greatly loved for its domestic habits and companionship with man, having greatly increased and extended its range with the increase of habitations. Originally it nested in caves and about cliffs, but like its American cousin it has for the most part long since abandoned this primitive way of living, and now places its nest on the rafters of an outbuilding or a ledge in a chimney. The nest and eggs are hardly distinguishable from those of our Barn Swallow.

Kamchatkan Barn Swallow. — Even more closely related to the American species is the Kamchatkan Barn Swallow (*H. tytleri*) of northeastern Siberia and Kamchatka, about the only difference being the much longer tail and more deeply colored under parts; its habits are presumably similar to those of its near relatives.

African Stripe-breasted Swallow. — While we have not space to mention all of the other species of *Hirundo*, we may not omit the large, Stripe-breasted Swallow (*H. cucullata*) of South Africa, which, says Dr. Sharpe, "is the household Swallow of the colony, breeding freely about the houses and in the country, often selecting the usual living-room of the family. In the city this familiarity is not permitted, on account of the dirt made by the birds; but the Boer fixes up a board under the nest, to prevent the worst fouling, and considers that the rest is atoned for by the destruction of the myriads of flies, of which his little favorites rid him during the season of their stay. And only those who have sojourned in a Boer's house can estimate the plague of flies that infest it; they swarm on 'bed and board'; they pollute the food and drink; chairs, tables, walls, everything is blackened by them. As you sit at meals the graceful bird hawks over the table and snatches the flies from wall and ceiling; nor is this the only service he renders, for sitting on the top of the window or door (always left open for his accommodation) he pours out a short but lively song, which enlivens the dreary solitude and silence of the lone homestead. The nest of this species is always attached to the under side of the place chosen, and is composed of little pellets of mud, like that of the English Swallow. In shape it resembles a gourd with a long neck, cut longitudinally and glued up by the edges to the ceiling. It lays four or five pure white eggs."

American Tree Swallow. — With a couple of other species, both American, we may close our consideration of this subfamily. The Tree Swallow (*Iridoprocne bicolor*), which may be known by its steel-blue or steel-green upper parts, pure white lower parts, and slightly forked tail, is found, though somewhat locally, throughout North America, nesting as far north as Labrador and Alaska. As its name implies, it is mainly given to nesting in trees, but, to quote from Mr. Chapman, "Tree Swallows are passing through a transition period in their history, some accepting the houses or boxes erected by man as a substitute for the holes in trees or stumps which others still use." These vivacious and active little birds are found about habitations on the outskirts of cities as well as in the wilder, still unsettled portions of the country, selecting a nesting site pref-

erably near the water. They lay from four to six pure white eggs. Very soon after the nesting season is passed they congregate in flocks often of vast size, before beginning their southern migrations, such, for example, as the myriads noted by Bachman, who "saw such an immense quantity of this species of bird that the air was positively darkened. As far as the eye could reach, there were Swallows crowded thickly together, and winging their way southward; there must have been many millions!"

The **Violet-green Swallow** (*Tachycineta*) is smaller than the last, not attaining a length of five inches, and has the upper parts a soft, silky green, bronze, and violet, without gloss or sheen, while the entire under parts, including the sides of the head and a fluffy patch on the flanks which tends to join its fellow over the rump, pure silky white. The typical form (*T. thalassina*) occurs only on the Mexican plateau, our common Violet-green Swallow (*T. t. lepida*) of western North America from Mexico to the Yukon valley, Alaska, being a subspecies, the only other form occurring in southern Lower California. The Violet-green is a common bird in suitable localities throughout its range, spending the summer months usually at a considerable altitude, as, for example, in the Needle Mountains in Colorado, where it was observed by the writer at an elevation of 8000 or 9000 feet. It is a pretty graceful species observed in small parties, now stopping on some dead branch to preen its beautiful plumage, then darting off to course up and down over valley and stream in quest of its prey. It nests in holes in trees and crevices among rocks, making a nest of grasses, feathers, etc., and laying pure white eggs.

African Saw-winged Swallows. — The second subfamily (*Psalidoprocninæ*) comprises, as here restricted, only the Saw-winged Swallows of Africa, their most marked character being the fine serrations on the outer webs of the primaries in the male. They differ from the American Rough-winged Swallows by having longitudinal instead of rounded nostrils, and the prevailing color of the plumage black instead of brown. As they do not exhibit any features of particular interest as regards habits, their further consideration may be omitted.

THE CUCKOO-SHRIKES

(Family *Campephagidæ*)

The Cuckoo-Shrikes, or Caterpillar Catchers, as they are oftener and perhaps more appropriately termed, form quite a large group of a dozen genera and upward of one hundred and seventy-five species, all natives of the Old World. They are usually placed near, and by some authorities directly with, the Shrikes (*Laniidæ*), which they approach rather closely in having a generally stout, moderately notched and hooked bill, but from which they differ uniformly in having the feathers of the lower back and rump with more or less stiffened shafts, "a feature easily ascertained by running the thumb against the plumage nail down." As further characters, it may be mentioned that the nostrils are

nearly concealed by the nasal feathers, the rictal bristles but feebly developed, and the wings long and pointed, while the moderately long tail may be either square, forked, or graduated. The plumage is ordinarily soft and Shrike-like, the usual coloration being bluish gray or black and white, though in some forms it becomes exceedingly brilliant with scarlet, crimson, orange, or yellow markings; the sexes are usually quite different in plumage.

Cuckoo-Shrikes. — Passing over the genus *Artamides*, which is a very large one of thirty-five or more forms ranging from the Andamans to the New Hebrides and New Caledonia, and is characterized by a very large, stout bill and generally slate-colored, often barred, plumage, we may select for mention a few forms of the equally large genus *Graucalus*, which spreads from Africa to India and Australia. They are birds of moderate size, mostly ranging between eight and twelve inches in length, of plain appearance, the general coloration being gray or bluish gray with black and white areas, and often barred below. They are arboreal in their habits, mostly frequenting well-wooded localities where they procure their food of insects among the leaves and branches. Of the nine Ethiopian forms, the Gray Cuckoo-Shrike (*G. cæsius*) is confined to South Africa, going about in small flocks and frequenting mostly the tops of the lofty trees, where it searches industriously for its food, while the Ash-colored Cuckoo-Shrike (*G. cinereus*) is found only in Madagascar. The Indian Cuckoo-Shrike (*G. macei*) is a large and extremely variable species, the upper parts being gray, paler on the rump, and the lower parts grayish white with the lores and feathers about the gape black. It is more or less common throughout almost the whole of India and Ceylon, nesting from May to October, and constructing a shallow nest of slender twigs, placed high in a leafy tree; the eggs, normally three, are pale green spotted with brown and purple. Of the several species found in Australia, the best-known is the Black-faced Cuckoo-Shrike (*G. melanops*), which is not only general throughout that country but extends to New Zealand and many of the larger islands to the northward of Australia. It is of large size, reaching a length of twelve and a half inches, and, as its vernacular name implies, has the forehead, face, and throat black. It is an abundant species in many parts of its range, frequenting low hills, flats, and thinly forested plains, especially the plains of the interior. "Its flight," says Mr. Gould, "is undulating and powerful, but is seldom exerted for any other purpose than that of conveying it from one part of the forest to another, or to sally forth in pursuit of an insect which may pass within range of its vision while perched on some dead branch of a high tree. On such an elevated perch it sometimes remains for hours together; but during the heat of the day seeks shelter from the rays of the sun by shrouding itself amidst the dense foliage of the trees. Its food consists of insects and their larvæ and berries, but the former appear to be preferred, all kinds being acceptable. Its note, which is seldom uttered, is a peculiar single purring or jarring sound, repeated several times in succession." It makes a very slight, shallow nest of short twigs firmly secured together with cobwebs, which forms a little, usually triangular sack on or across the angle of a thin, forked, horizontal branch. The nest is usually ornamented with bits of

Fig. 202. — Ash-colored Cuckoo-Shrike, *Graucalus cinereus*.

lichen which so closely simulate a branch that it is extremely difficult of detection unless the bird is observed building it. It lays two or sometimes three glossy eggs which range in color from light green through dull green to yellowish olive, blotched with umber and reddish brown.

Australian Caterpillar Catcher. — Differing mainly from the last in possessing a longer, thinner bill is another large genus (*Edoliosoma*) of which the Cater-

pillar Catcher (*E. tenuirostre*) of Australia generally may be taken as an example. It is a dark slaty gray above, the wings being black, each feather broadly margined externally with whitish, while the lores, cheeks, and ear-coverts are black; the female is mainly ashy brown; the length is about ten inches. This bird, according to Gilbert, is extremely shy and retiring in its habits, generally occurring in the topmost branches of the loftiest and most thickly foliaged trees growing near swamps, where it is always observed singly. Its note is a harsh, grating, buzzing sound, repeated rather rapidly about a dozen times in succession, and is likened by Campbell to the pulsating sound of a large cicada. It builds a nest quite similar in appearance and situation to that of the Black-faced Cuckoo-Shrike just described, but lays only a single egg, which is pale or light green in color, spotted or blotched over nearly the whole surface with brownish.

African Black Cuckoo-Shrike. — The typical genus (*Campephaga*) is entirely confined to Africa, and, as now restricted, comprises only seven species, which are distinguished among other things by a relatively broad bill and an extremely long tail. In the Black Cuckoo-Shrike (*C. nigra*) of South Africa the male is entirely black, while the female is mottled with blackish bars above and white barred with blackish brown beneath. It is a rather solitary bird, frequenting trees but often flying to the ground to pick up caterpillars.

The **Minivets** (*Pericrocotus*), of which there are over thirty species, are by far the most brilliant members of the group, scarlet and yellow being the predominant colors; they are confined to India and eastern Asia. They possess a strong hooked and notched bill which is about half the length of the head, and have the nostrils concealed by plumes, while the wings are very long and pointed, the tail long and much graduated, and the feet comparatively weak. With the exception of two or three species, the sexes are very different in coloration and the young resemble the females in the distribution of the colors, but have the entire upper plumage barred with white. "The Minivets are strictly arboreal, going about in small flocks and searching the leaves and branches of trees for insects," and they construct beautiful cup-shaped nests of mosses, coated with spiders' webs and lichens, in the slender branches of trees. In the male of the Indian Scarlet Minivet (*P. speciosus*) the whole head, back, and scapulars are glossy black, the rump and upper tail-coverts and the lower parts behind the throat a vivid scarlet, while the wings are black, barred with scarlet, and the tail, with the exception of the middle pair of feathers, is also scarlet; in the female the back of the head, back, and scapulars are gray, and the whole lower plumage yellow, which color also appears on the wings. Another handsome species, known as the Orange Minivet (*P. flammeus*), occurs in southern India and Ceylon. In this the male is glossy blue-black above, with the rump and upper tail-coverts fiery orange-red, the latter color prevailing over most of the lower parts. It is a common bird, usually seen singly or in small flocks, in the lofty forests of southern and western India, seeking its insect food among the branches or in the air. The males have a whistled note like *wheet, wheet, wheet.*

THE DRONGOS

(Family *Dicruridæ*)

The Drongos, or King Crows, constitute a small but rather sharply circumscribed group of exclusively Old World birds, having their center of abundance in southeastern Asia, whence they range over the Ethiopian region, and in decreasing numbers through the Malayan region to Australia. They are easily distinguished from all other passerine families by the generally black plumage and forked tail of ten feathers, the outer rectrices being in several forms much prolonged and more or less curved outward, while in other cases the outermost pair are expanded at the end into racket like forms. As a group the Drongos have usually been placed with or near the Shrikes (*Laniidæ*), whence they are sometimes called Drongo-Shrikes; but Mr. Oates, who has had unrivaled opportunity of studying the Indian forms, places them next to the Creepers (*Certhiidæ*). Judging from their skulls, Dr. Sharpe is of the opinion that they are not Shrikes but aberrant Flycatchers (*Muscicapidæ*), and from their style of nest thinks it possible that they have also some affinity with the Orioles (*Oriolidæ*); in the face of these conflicting statements it is obvious that we must await a fuller study of their structure as well as that of allied forms, before their position can be definitely fixed.

They are medium-sized birds, mostly between ten and twelve inches in length, though in certain of the long-tailed forms above mentioned the extraordinary elongation of the outer rectrices sometimes more than doubles their whole length. They have strong, somewhat Crow-like bills, the edges of both mandibles being smooth and the upper one provided with a single notch. Many of them are crested, and all possess more or fewer strong bristles at the base of the bill. The sexes are absolutely alike and the plumage of the nestling is like that of the adult bird, but paler.

The Drongos are quite handsome and, for the most part, familiar birds, some living in open country, others in gardens and fields, while still others occur only in the forests. They are active, wary birds, capable of strong and rapid but undulating and not sustained flight, and are usually observed in pairs or small parties. They are entirely insectivorous, and, according to Mr. Oates, "feed habitually on the wing, darting from some perch on a tree into the air to catch an insect and returning to the same or an adjoining branch," but they also to some extent seek their food on the ground and on the backs of cattle. The Drongos all have cheerful notes and are good mimics, some, such as the Large Racket-tail possessing a really fine song, it being in the estimation of many the "best-singing bird of the East." They are usually remarkable for their courage, fighting viciously and attacking with success such large birds as Hawks and Crows. Their nests are usually rather loosely constructed cup-shaped affairs of twigs, fine grasses, rootlets, leaves, hair, cobwebs, etc., generally placed on horizontal forks and often overhanging water; the eggs, usually three

or four in number, are white or reddish white marked with spots and blotches of various hues of red or purple.

While lack of space prevents extended mention of individual species, a few

FIG. 203. — Fork-tailed Drongo, *Dicrurus forficatus*.

representative forms may be briefly described. In the typical and largest genus (*Dicrurus*) the Black Drongo (*D. ater*) has the whole plumage deep black glossed with steel-blue, while the Ashy Drongo (*D. longicaudatus*) is metallic indigo above and dark gray below, and the White-bellied Drongo (*D. cærulescens*)

deep indigo above, gray on throat and breast, and white below; none of these has the head crested nor the outer tail feathers greatly lengthened. Closely related is the Bronze Drongo (*Chaptia ænea*) with the whole plumage black glossed with metallic bronze or lilac. The curious Hair crested Drongo (*Chibia hottentotta*) is exceedingly well marked by the presence of a bunch of some half a dozen "hairs" on the front part of the crown, and hackled feathers on the neck and breast; the plumage is excessively brilliant with metallic blue and bronze reflections over black. Coming now to those forms which have the outer pair of tail-feathers extravagantly lengthened, there is the Lesser Racket-tailed Drongo (*Bhringa remifer*), which ranges from the Himalayas to Sumatra and Java, and the Larger Racket-tail (*Dissemurus paradiseus*) of western India and the Malay Peninsula. The first has the racket like expansion of the outer feathers flat and equal on both sides of the shaft, while in the other it is curled and has most of the web on the outside. The Lesser Racket-tail is about eleven inches in length to the end of the middle tail-feathers, while the outer feathers are twenty or twenty-one inches long, of which the terminal four inches is taken up by the expanded portion, which is preceded by twelve inches of bare shaft.

THE WAXWINGS

(Family *Ampelidæ* or *Bombycillidæ*)

As here restricted the present family comprises only a single genus and three well-marked species, the presence of certain horny, bright red, wax-like drops on the tips of the feathers of the wings in two species having won for them the appropriate name of Waxwings. They are small arboreal birds, some six or eight inches in length, with long, pointed wings in which the outer or tenth primary is so much reduced as to be almost imperceptible, a short, even or slightly rounded tail, and legs of moderate length, while the bill is small, slightly hooked and notched at the tip, the gape broad and the linear nostrils nearly concealed by the dense, soft, velvety loral feathers. The head is provided with a long, pointed crest of soft, blended feathers. The wax-like appendages are present on the tips of the secondaries and occasionally appear also on certain of the tail-feathers; their presence is not peculiar to either age or sex, though the full-plumaged males are more likely to have them in a greater degree of perfection. Their function, if they have any other than that of ornamentation, is unknown. The whole plumage is very soft, the feathers of the head, neck, and body perfectly blended, the prevailing color being a soft fawn-color or vinaceous grayish brown, changing to ashy on the rump and upper tail-coverts, while the wings are slate, and the lores, a streak through the eye, and the chin are velvety black. Although not possessed of bright colors or a sprightly song — they are perhaps the most songless of all the so-called "singing birds" — the Waxwings are nevertheless among the most chastely beautiful birds of the Northern Hemisphere, to which they are exclusively confined. They are very gentle, usually tame and unsuspicious birds, going about in small or sometimes in large flocks, their only

note being a monotonous lisping sound barely audible at a short distance. They feed on berries and fruits of various kinds as well as occasional insects which they capture on the wing after the manner of Flycatchers. Their nests, which are rather bulky affairs, are placed in trees and composed of small twigs, rootlets, etc., lined with strips of bark, feathers, and other soft materials. The eggs, usually three to five in number, are dull bluish or purplish gray, spotted and dotted with dark brown, black, and purplish. The young have the under parts streaked.

Bohemian Waxwing. — The largest and perhaps handsomest species is the Bohemian Waxwing (*Ampelis* or *Bombycilla garrulus*), which is found throughout the northern portions of the Northern Hemisphere, in America coming to the northern borders of the United States in winter, but breeding far northward. In the Atlantic States their coming is very irregular, but in the northern Mississippi Valley and other northern states they are of more common occurrence. They feed particularly on berries of the mountain ash, and there is no more beautiful sight than a tree filled with these birds, their soft plumage set off by the bright red berries. Their nests and eggs long eluded discovery, especially in North America, but they have been found near the Great Slave Lake, and more recently Mr. Allen Brooks has obtained them in the caribou district of the northern interior of British Columbia. He observed a colony of five pairs and discovered four nests in proximity and all in pine trees at a height of twenty-five feet or more. One nest in addition to a lining of finer material had several green aspen leaves as an inner lining, no doubt to render the eggs less conspicuous.

The **Cedar Waxwing**, Cedar-bird, or Cherry-bird (*A. cedrorum*) is found throughout the whole of temperate North America, ranging south in winter to Guatemala and the West Indies. It is especially abundant in summer in the New England and middle western states, roving about excepting during the short nesting period in small flocks, and feeding on ripe cherries, both wild and cultivated, cedar berries, and the berries of the black gum; they also feed extensively on insects. They nest especially in fruit and shade trees, building the usual bulky nest.

Japanese Waxwing. — The remaining species is the Japanese Waxwing (*A. japonicus*) of Japan and the neighboring parts of Asia; it is the only species without the sealing-wax-like tips to the secondaries, and has the tail tipped with a beautiful rose-red instead of yellow.

THE SILKY FLYCATCHERS

(Family *Ptilogonatidæ*)

This is also a small family, embracing but three genera and four or five species, closely related to the Waxwings, with which they have usually been included, but from which they differ in having short, rounded wings in which the outermost primary is nearly half the length of the next, long, fan-shaped

tails, and a broader bill surrounded by conspicuous rictal bristles. They agree with the Waxwings in having a long head crest and the soft, silky plumage, which is of plain though often handsome colors, but they lack the wax-like ornaments. They have much the same habits except that they perhaps feed to a little greater extent on insects. They range from Central America through much of Mexico, a single species, known as the Phainopepla or Crested White-winged Flycatcher (*Phainopepla nitens*), reaching into the southern portions of the United States as far north as Utah and southern Colorado. In this species the sexes are very different, the male being a uniform glossy blue-black except for a conspicuous patch of white on the inner webs of the primaries, while the female is plain brownish gray with certain of the feathers white-edged; the length is between seven and eight inches. This is a shy, active bird of the arid regions, frequenting the mesquite thickets especially of the open country and along the foot-hills, where they may be found in small parties or sometimes more abundantly. As they sit on the topmost branches they have the habit of jerking the tail. They feed greedily and perhaps principally on the berries of the mistletoe, choke-cherry, and certain grapes during the season, and at other times largely on insects which they capture on the wing. The nest is a rather loosely made structure of twigs, mosses, plant fibers, etc., placed in the branches of a tree or large bush, usually between ten and twenty feet from the ground, the location being a thicket or open woods generally not far from water. The eggs, two or three in number, are light gray spotted with black.

In *Phainoptila melanoxantha* of the high volcanoes of Costa Rica and Panama the male is glossy black above with a band of olive-yellow across the rump and ashy gray with yellow on the sides and flanks below, the female being dark yellowish olive above set off by a black cap, and olive and yellow below.

THE PALM CHATS

(Family *Dulidæ*)

Allied to the Silky Flycatchers and Waxwings, but differing from them in having much stronger bills and feet, a shorter tail, and harsher, firmer plumage, is the little group embracing a single genus and two species known as the Palm Chats (*Dulus*). In the principal species (*D. dominicus*), which is confined to the island of Santo Domingo, the color is dark brown washed with olive above and yellowish white broadly streaked with brown below; it is nearly eight inches in length. This species, known locally as the Palm Sparrow, is a very common bird, breeding in colonies in nearly every grove of royal palms. According to Dr. Christy, the nests are sometimes very large, quite an armful of twigs interwoven into a compact mass in the head of the palm or on the cluster of berries just below the head. In this ball of sticks there are generally three or four nests, merely burrows into the side of the mass, the end lined with finer twigs. Its habits are peculiar in many ways, and with its powerful legs, feet, and bill it breaks off and

carries up into the palm tree sticks astonishingly large for its size. They are also very noisy birds with an aggressive way about them, and at intervals they set up a tremendous racket, every bird in the colony suddenly, and as if at a given signal, making as much noise as possible. This lasts for about ten seconds or so, and then stops as suddenly as it began. They feed on both fruits and insects.

The White-naped Palm Chat (*D. nuchalis*) is known from a single specimen said to have come from Brazil, but more probably from some West Indian island; it is similar to the other, but has a white patch on the nape.

THE WOOD SWALLOWS

(Family *Artamidæ*)

There is a small group of little, "chubby," Swallow-like birds in the Indian and Australian regions known as the Wood Swallows, the affinities of which have been the subject of not a little uncertainty and speculation among bird students. By some they are regarded as being most closely related to the Shrikes (*Laniidæ*), on which account they are often called, especially by the Anglo-Indian ornithologists, the Swallow-Shrikes, while others would place them next the Orioles (*Oriolidæ*) or Starlings (*Sturnidæ*). All things considered, it seems likely that their affinities are more with the Waxwings (*Ampelidæ*) and the true Swallows (*Hirundinidæ*), and they are here placed near these groups. They are small, active birds, mostly about seven and a half inches in length, with long, pointed bills with the nostrils placed low, rather short, broad tails, and long, ample wings which reach to the end of the tail. The plumage is mostly brown, gray, or black above, relieved in some species by a pure white rump and lower back, and largely white or gray below.

The Wood Swallows are largely insectivorous, although Gould mentions that some are occasionally observed to feed on the seeds of the grass tree. They frequent mostly open or sparsely wooded regions, where they may be found usually in small parties of a dozen or less; at times, however, they congregate in large flocks. Their insect food is taken largely on the wing and during its pursuit they exhibit much of the ease and grace of movement that characterizes the true Swallows, now rising high above the tree-tops, now falling to near the surface as the insects attract their attention. It is not an uncommon sight to see a dozen seated on the branches of a tree, from which vantage point one after another may sally forth in pursuit of passing insects. There is little concert of action among them, however, each resting or hawking for food as inclination prompts. Occasionally when flying insects are scarce they are known to descend to the ground to search for beetles and other ground-haunting forms. While some species are undoubtedly migratory, coming and going with the change of seasons, others are almost as certainly permanent residents where found.

One of the most remarkable habits of the Wood Swallows is that occasionally observed of their "bunching" or clustering together in great numbers after the

manner of a swarm of bees. In cold or wet weather they select a spot under an overhanging flake of bark, under a leaning tree, or in the branches of a tree near the ground or well up, where they cluster one upon another, with the heads all upward, sometimes forming bunches "two armfuls around." The object of this is unknown unless it is for mutual warmth and protection, as it has only been observed on wet or cold days. When a cluster is suddenly disturbed from this position the rustle of the myriad wings as they are startled into flight has been likened to a mild clap of thunder. On the ground beneath a cluster it is not unusual to find several dead birds which have been smothered or have succumbed to the cold.

The Wood Swallows number about twenty species, and all but one are referred to the genus *Artamus*, this being the West African False Swallow (*Pseudochelidon*). They appear to have their center of distribution in Australia, but occur as well in New Guinea, Moluccas, Celebes, Philippines, Borneo, Java, etc. The head, throat, and back are sooty gray, the primaries and tail brownish black, and the rump, chest, and under parts mostly pure white. They frequent the vicinity of water and build an open nest of coarse yellowish grass, in Australia, usually placing it within the old abandoned nest of the Magpie Lark (*Grallina picata*) occasionally in a hollow limb or rarely in a forking branch. The eggs, usually four in number, are pointed oval in shape and pinkish white, blotched chiefly around the larger end with brown. The nesting season extends from September to January, and usually two broods are reared in a season. A very handsome species, inhabiting mainly the great interior of Australia, is the White-browed Wood Swallow (*A. superciliosus*), a bird about seven inches long, with the upper parts dark gray and the lower parts a deep rich chestnut, while the head is mainly black set off by a stripe of pure white over the eye, whence of course the common name. The female is similar but paler. They usually construct an independent nest, placing it in a forked branch or on a bit of projecting bark, though occasionally making use of an abandoned nest; the eggs are two or three in number and greenish gray mottled and spotted with umber and slate. In seasons of protracted drought or on the occasion of a caterpillar or locust plague, they often move in flocks toward the seacoast; their destruction of these noxious insects is immense. Another species is the Masked Wood Swallow (*A. personatus*), so called from the fact that the face, ear-coverts, and throat are jet-black, the remainder of the plumage both above and below being gray. Their habits are similar to those of the last except that they appear to line their nests with green instead of dead grass. Other species are the Dusky Wood Swallow (*A. sordidus*), which is dusky gray throughout except the dark bluish black wings, the outer primaries of which are edged with white, and the Little Wood Swallow (*A. minor*), which is the smallest of the group, being only about five and a half inches long and resembling the last-mentioned in miniature. Of the Indian species (*A. fuscus*), Oates says: "They are usually found in flocks. They perch chiefly on dead trees and launch themselves into the air to capture insects, returning to the same perch again; at times, however, the whole flock will sail about high in the air for long intervals, after the manner of the Swallows but

with a more direct flight. They are very fond of palm trees, and frequently select these trees for the purpose of breeding, the nest being placed at the junction of a leaf with the trunk. The nest is made of grass and twigs and is of rather slight make."

THE VANGA-SHRIKES

(Family *Vangidæ*)

This small and relatively unimportant family, embracing but a dozen forms, is entirely confined to Madagascar, and has but recently been separated from the Wood Shrikes (*Prionopidæ*), which they somewhat resemble.

They are medium-sized birds, with a rather lax, soft plumage, a strong, rather broad bill which is both toothed and notched, while the nostrils are practically uncovered. In the typical species known as the Vanga or Hook-billed Shrike (*Vanga curvirostris*) the bill is particularly strong and broad at the base, with the tip strongly hooked. This species, which is between nine and ten inches long, has the back, shoulders, and larger coverts entirely black, the wings black-edged and barred with white, the basal two thirds of the tail gray and the terminal portion black with white tips; the head is black, separated by a distinct white collar, and the under parts pure white. According to Grandidier this is a solitary bird, frequenting open woods and forests, perching by preference on the branches of a tree where it may remain motionless for hours, watching for its prey, which consists of insects, occasionally giving voice to a piercing whistle. Their nests are placed but a few feet above the ground and their white eggs are spotted with brown. Similar to this species in habits are the members of the genus *Xenopirostris*, in which the bill is peculiar in that the mandible is bent upward so as to leave a space between it and the maxilla. The handsomest members of the group belong to the genus *Artamia*, in which the upper parts are a glossy cobalt-blue or greenish black, and the under parts pure white. The commonest species is perhaps *A. bicolor*, which inhabits the forests of the high mountains, frequenting in small parties the summits of lofty trees, where it flies energetically about in search of its food; its eggs are green spotted with brown.

THE SHRIKES

(Family *Laniidæ*)

If the discussion of this group could be confined to the New World representatives, it would be a very easy undertaking, for only two species of a single genus find asylum there, and these almost wholly to the north of the Mexican line; but when we invade the Old World stronghold of the group, we are confronted by such a bewildering maze of more or less interrelated forms that the task becomes well-nigh hopeless, at least in the light of our present knowledge regarding

Fig. 204. — Vanga or Hook-billed Shrike, *Vanga curvirostris*.

their anatomy and probable kinship. A typical Shrike is easy enough to recognize and define, but there are so many outlying forms connected by a more or less pronounced gradation of characters that it is extremely difficult to draw any wholly satisfactory circumscribing line. Dr. Gadow, who monographed the group for the "Catalogue of Birds," makes it include five subfamilies, among them the Vireos (*Vireonidæ*), which have long been accorded full family rank and are much more akin to the Swallows and Waxwings than the Shrikes. Mr. Oates,

in the "Fauna of British India," recognizes but two subfamilies,—the *Laniinæ*, which embraces not only the true Shrikes but the Pied Shrikes, Wood Shrikes, Jay-Shrikes, Minivets, and the Cuckoo-Shrikes, and the *Artaminæ*, or Wood Swallows. But the Cuckoo-Shrikes (*Campephagidæ*) are now known to be most closely related to the Old World Flycatchers (*Muscicapidæ*) and the Wood Swallows to the Waxwings (*Ampelidæ*). The Drongos, or Drongo-Shrikes (*Dicruridæ*), now thought by some to be most closely related to the Creepers (*Certhiidæ*), were at one time placed among or near the Shrikes, and the so-called Wood Shrikes (*Prionopidæ*) are still often so placed. One of the latest to pronounce upon this very puzzling group is Dr. Sharpe in his "Hand-List of Birds." After setting up as separate families the *Vangidæ*, or Vanga-Shrikes of Madagascar, the *Prionopidæ*, or Wood Shrikes, and the *Aërocharidæ*, comprising only the curious Helmet-bird of Madagascar, he still admits four subfamilies in the *Laniidæ*, and we may as well follow this disposition, premising, however, that neither this arrangement nor any thus far proposed is likely to be final. As the appearance and habits are so different in the several groups, no general statement such as that introducing most of the other families will be attempted. The members of the first subfamily (*Gymnorhinæ*) are known collectively as the Crow-Shrikes, this designation, as might be presumed, having reference to their marked resemblance to the Crows. This likeness, which according to Dr. Gadow really does not extend beyond similarity in size and color pattern, was at one time considered of so much importance as an indication of affinity that certain of them were included directly with the typical *Corvidæ*. They are strongly built, mostly large birds for the group, being between ten and twenty inches in length, and have a long and straight, usually hooked bill, with the narrow nostrils completely bare and situated a long distance from the line of feathers, the latter a character which serves to separate them from most of the *Corvidæ*. They have long, pointed wings in which there are ten primaries, the outer one being half or two thirds the length of the second, the tip of the wing being formed usually by the third and fourth primaries. The plumage in the members of this subfamily is mostly plain, the usual colors being black, white, gray, rufous, and red, and the sexes are alike or nearly so, while the young incline to brownish with cross-bars on the feathers.

Piping Crows. — The Crow-Shrikes as here accepted number about two dozen species, disposed among four genera,[1] and have their headquarters in Australia, whence a very few range into the Papuan Islands and New Guinea, and a single very peculiar one occurs in Borneo. In the typical genus (*Gymnorhina*), the four species of which are confined to Australia and Tasmania, the bill is long, straight, and pointed, with a slight notch but no hook. They are known as Piping Crows or locally as Australian Magpies; the only colors in the plumage are black and white. The best-known species is the Black-backed Piping Crow (*G. tibicen*) of Australia generally, a bird about fifteen inches long, of a glossy

[1] Mr. Ridgway is of the opinion that the genera *Cracticus* and *Strepera* should be separated as a distinct family (*Streperidæ*), and this is perhaps true.

blue-black, with the nape and hind neck, as well as the secondaries, upper and under tail-coverts, and the bases of the tail feathers pure white. According to Gould, this bold and showy bird greatly enlivens and ornaments the lawns and gardens of the colonists, and with the slightest protection from molestation becomes so tame and familiar that it approaches close to their dwellings and perches around them and the stockyards in small families of from six to ten in number. As they prefer cleared lands, open flats, and plains skirted by belts of trees, they are much more abundant in the interior than in the neighborhood of the coast, and they seek their food, which consists almost entirely of insects such as locusts and grasshoppers of which they consume immense quantities, mainly on the ground, over which they run with the greatest facility. Their song is very peculiar, consisting of a single clear, choral-like note, repeatedly uttered, not only while passing over the country, but more especially in early morning, when they assemble in small parties in the leafless branches of some fallen eucalypt. They make very easily kept and amusing cage birds, though their vocal abilities when in captivity vary somewhat, certain individuals possessing the full song and others only a weak imitation. The nesting season begins in August and lasts for quite six months, during which two broods are generally reared. The nest, usually placed at a great height, is a large, round, deep, and open affair, composed outwardly of sticks, leaves, wool, etc., and lined with softer material; the eggs, three or four in number, are bluish white with large blotches of brownish red or light chestnut-brown. Quite similar to this species is the White-backed Piping Crow (*G. leuconota*) of South Australia, which differs mainly in having the whole back pure white. It is, however, a very much shyer bird, frequenting the plains and open hilly parts of the country, spending most of its time on the ground; its notes and habit of early morning caroling are the same. Also similar but smaller is the Tasmanian Piping Crow (*G. hyperleuca*), an elegant and animated native of Tasmania, where it is met with in small flocks. "When perched on the dead branches of the trees soon after daybreak," says Mr. Gould, "it pours forth a succession of notes of the strangest description that can be imagined, much resembling the sounds of a hand-organ out of tune, and as it possesses the power of imitation in an extraordinary degree it may be easily taught to whistle various tunes as well as to articulate words." It nests in the highest branches of the gum trees, building a nest of coarse sticks and lining it warmly with wool, feathers, etc.

True Crow-Shrikes. — The "true" Crow-Shrikes (*Strepera*), numbering some eight species, are often placed with the Crows, to which, however, they seem to show but little real affinity. They are much larger birds than those just considered, approximating twenty inches in length, with long, stout, distinctly hooked bills and long, pointed wings; the plumage is mainly black, gray, and white. Their characteristics as a group are so well set forth by Mr. Gould that his general account is subjoined in full: "These birds seek their food on or near the ground, sometimes in swampy situations and even on the seashore, at others on the most sterile plains far distant from water; grasshoppers and insects of every order are eaten by them with avidity, and to these grain seeds and fruits

are frequently added; they hop with remarkable agility over the broken surface of the ground, and leap from branch to branch with great alacrity; their flight is feeble and protracted, and they seldom mount high in the air, except for the purpose of crossing a gully, or for passing from one part of the forest to another, and then merely over the tops of the trees; during flight they utter a peculiar shrill cry, which is frequently repeated and answered by other birds of the same troop, for they mostly flit about in small companies of from four to six in number. All the species occasionally descend to the cultivated grounds, orchards, and gardens, and commit considerable havoc among their fruits and grain; in many parts of Australia, and particularly Tasmania, they form an article of food and are considered good and even delicate eating. They usually build open cup-shaped nests as large as that of the Crow, composed of sticks and other coarse materials, lined with grasses, etc.; the eggs are generally three, but sometimes four in number." One of the best-known species is the Pied Crow-Shrike (*S. graculina*), which is widely spread over South and East Australia; the color is a fine bluish black, with the basal half of the primaries and the basal half of the tips of the tail-feathers, as well as the under tail-coverts, snow-white.

The largest genus of Crow-Shrikes is *Cracticus*, which includes about a dozen species of smaller birds, from ten to thirteen inches long, with a bill like that of the Piping Crows, but stouter and more strongly hooked; they likewise have a plumage exhibiting only black, white, and gray. They feed upon small quadrupeds, birds, lizards, and insects, which they frequently impale after the manner of the ordinary Shrikes.

The only member of the subfamily showing red in the plumage is an anomalous appearing bird of Borneo (*Pityriasis gymnocephala*), which has the head partially bare and the feathers of the crown, ear-coverts, and lower throat transformed into very peculiar structures. About ten inches long, it is grayish black above, the bare portion of the head yellow, and the loral plumes, sides of the face, entire throat, and a neck collar brilliant scarlet.

True Shrikes. — The Shrikes *par excellence* are comprised in the subfamily *Laniinæ*, and with few exceptions are birds of small size, at least as compared with those already considered, being mostly under ten inches in length. They are robust, stocky birds, with a rather lax, never brilliantly colored, plumage, and a very strong bill which is both hooked and notched. The round nostrils are situated near the base of the bill, being usually completely ossified and partly covered with feathers and bristles. The wings are short and rounded though powerful, and possess ten primaries, of which the outer is sometimes rudimentary, but usually more than half the length of the ninth; the tail of twelve feathers may be graduated or square, but never forked. The scutellated tarsi are short and the feet moderately strong, though it would seem quite out of keeping with their rapacious habits. The plumage is soft and blended, the predominating colors being plain gray, brown, or rufous, varied with black and white; the sexes are usually alike in color, but the young may always be known by having the plumage more or less distinctly barred or vermiculated.

With the exception of less than half a dozen outlying species (referred to

three genera) the entire membership of this subfamily has been included within the limits of a single genus (*Lanius*), though largely on the basis of color a recent authority has separated this host of more than seventy forms into six genera, the principal one still being *Lanius*, to which is assigned nearly half the forms. They are mainly natives of the Old World, ranging widely over the Palæarctic, African, and Indian regions, and although present in the New World are represented by only two species and a small number of geographical races, none of which occurs south of Mexico.

The name of Shrike as applied to these birds is of very ancient origin, being derived, it is thought, from the Anglo-Saxon, signifying a bird that screeches or shrieks, since their ordinary notes are harsh and often grating. Another almost equally well known, popular appellation is that of Butcher-bird, which of course comes from their distinctly rapacious habits, but these are but a fraction of the local names commonly applied to them, M. Rolland, for instance, having listed nearly a hundred that are thus bestowed in France and Savoy alone. Shrikes are for the most part bold and fearless birds, sometimes shy, but usually indifferent to the presence of man, ordinarily going about singly or in couples and frequenting mostly open situations such as bushy hillsides, hedgerows, orchards, or fields where there are scattered trees. As if conscious of its prowess the Shrike makes little attempt at concealment, but, appropriating to himself sufficient territory for his needs within the limits of which no other bird may safely intrude, he "becomes the terror of the neighborhood, and woe to the unlucky Finch or Warbler that dares to rustle in the nearest bush!" But it must not be inferred, says Dr. Coues, that he "is always on the war-path, intent on prodigies of valor. The doughtiest knights lay aside their armor at times and the Shrike is fond of his ease in the intervals of his piratical enterprises. At such times you may observe him lounging about with his hands in his pockets, so to speak, and nothing on his mind. Sometimes you will see him ready for business, scanning the neighborhood closely from his watch-tower on the topmost twig of some bush or sapling, where he stands stiffly, bolt upright, like a soldier on dress parade, ready to move at a moment's warning. He makes a rather imposing picture just then in his uniform of French gray with black and white facings (Dr. Coues is speaking of the American Butcher-bird), which fits him 'like a dream': the next instant — whish! he is gone, and the piteous cry of a Sparrow in yonder bush tells the rest of the story."

Shrikes subsist on large insects, especially grasshoppers and locusts, small frogs, and reptiles, as well as small mammals, such as mice, and shrews, and birds, many of them quite as large as themselves. In capturing their prey, they do not grasp it in the feet as do the Hawks, but strike it down by a blow from the strong bill, the hooked and toothed tip of which is admirably adapted for cutting and tearing it. They are bold and audacious in the pursuit of their quarry, frequently attacking caged birds and even entering open windows to get at the pets, and they have the universal habit of impaling their prey on sharp branches or thorns, sometimes, it is asserted, before life is extinct. It is of common occurrence to find a thorny bush bearing quite a collection of spitted grasshoppers,

mice, and small birds, and, although various theories have been proposed to account for the origin of this curious habit, — some asserting that it is done for the purpose of alluring further victims within reach, others that it is simply a well-stocked larder, — it seems probable that it has resulted from their attempt to find a support for their food while devouring it, their rather weak feet precluding their holding it very securely. In common with other rapacious animals they sometimes kill more than they can possibly use, and kill for the mere wanton love of killing.

The Shrikes construct very bulky nests of sticks, dried grasses, strips of bark, wool, feathers, etc., and usually place them low in small, often thorny trees and hedges; the eggs usually number from four to seven and are dull whitish, spotted with brown.

American Shrikes. — Of the two species inhabiting North America the larger is the Great Northern Shrike, or Butcher-bird (*Lanius borealis*), which is found in all portions of the Fur Countries up to the limits of arboreal vegetation, if not still farther. Here some individuals spend the whole year, but the greater number migrate southward in fall and become dispersed over the middle portions of the United States. It is a little more than ten inches in length, gray above and white, generally finely barred below, the wings and tail black with the base of the primaries white, the tips of the secondaries white or grayish, and the outer, sometimes all the tail-feathers tipped with white, while the forehead is whitish, the lores grayish black, and the ear-coverts black. Although usually to be found in fall and winter along hedgerows and in bushy fields, when food becomes scarce it frequently visits cities, where, if not molested, it kills large numbers of English Sparrows, and for this purpose deserves abundant protection.

The other American species is the Loggerhead Shrike (*L. ludovicianus*), which in some half a dozen geographical races is spread over a large portion of the United States and Mexico; it is known by its smaller size — usually not exceeding a length of nine inches — and by its wholly black lores, while the lower rump and upper tail-coverts are usually pale gray or sometimes nearly white. The typical form is confined to the South Atlantic and Gulf States, where it is resident, while in southeastern Canada and the eastern United States occurs the Migrant Shrike (*L. l. migrans*), which has a smaller bill and a tail shorter instead of longer than the wing; in the winter it abandons the more northern portions of its range and spreads over the Middle States and the lower Mississippi Valley. In northern North America from the eastern border of the Plains this is replaced by the White-rumped Shrike (*L. l. excubitorides*), a paler form in which the white, especially of the wings, is more extensive; other forms occur on the upper Pacific coast, islands off the California coast, and in the table-land of Mexico. They all have practically the same habits as already pointed out for Shrikes in general.

Great Gray Shrike. — Of the numerous Old World forms, mention may be made of the Great Gray Shrike (*L. excubitor*) of northern Europe and northern Asia, which is quite to be compared with our Northern Shrike, but has the under parts pure white and more white on the wing. It frequents in summer the bor-

Fig. 205. — Bull-headed Shrike, *Lanius bucephalus*.

ders of forests and open plains where there are trees scattered about, being a rather shy bird even when unmolested, but in winter coming about orchards and hedgerows. It is to a large extent migratory, and considerable numbers visit England and Scotland during the fall, and may sometimes spend the winter, leading for the most part a solitary existence, watching assiduously from the top

of some leafless tree for its prey of field mice, shrews, and small birds. It is detested by gamekeepers and usually destroyed on sight, though the good it accomplishes probably much more than offsets its evil deeds. It has often been made use of by falconers in capturing certain Hawks, its hoarse cry giving notice of the approach of one of these birds. Its bulky nest is placed in a variety of situations, such as low bushes, orchard trees, and birch, oak, or rarely spruce trees, when in the latter often at a considerable height from the ground; it is composed of twigs, grass stems, and moss, and lined with wool, feathers, and hair. The four to six or seven eggs are dull white with spots and blotches of dull brown and lilac; two broods are often reared in a season, and the parents are very solicitous in their care of the young.

Differing from the last in being much paler and showing much more white on the wings is the White-winged Shrike (*L. leucopterus*) of central Siberia and central Asia, which is replaced in eastern Siberia and northern China by the Long-tailed Gray Shrike (*L. sphenocercus*), which has still more white on the wings and a considerably longer tail. Belonging to the same group is the Lesser Gray Shrike (*L. minor*) of central and southern Europe, the Pallid Shrike (*L. pallens*) of Northwest Africa, the Indian Gray Shrike (*L. lahtora*) of India, etc.; their habits are those of the species already described.

Red-backed Shrike. — Of similar appearance and habits but differing considerably in plumage is a group of which the common Red-backed Shrike (*L.* [*Enneoctonus*] *collurio*) of Europe and Asia as far east as the Altai range, wintering in Africa as far to the south as Cape Colony, may be taken as an example. Only about seven inches in length, it has the mantle chestnut-brown, the lores, frontal band, and ear-coverts black, and the under parts rose-buff, while the wings are dark brown edged with rufous and the tail-feathers white at the base. It is a strictly migratory species, arriving rather late from its far southern winter home, and in the British Isles, where it is the only breeding Shrike, frequenting plains, fields, gardens, and hedgerows. Its food consists principally of insects, especially grasshoppers, but it also feeds to some extent on mice and small birds, all of which it often impales on thorns after the manner of its kind. Its nest-building enterprise is undertaken in May or June, "the bulky nest of twigs, roots, grasses, etc., lined with wool, moss, or hair being usually placed in a low bush or high hedge; the eggs, four to six in number, vary from bright greenish gray with light violet shell markings and brown surface spots to pale salmon-color with violet shell and reddish surface blotches." Its congeners to the number of half a dozen range over Africa and southern and southeastern Asia.

Masked and Woodchat Shrikes. — Both the Masked Shrike (*L.* [*Phoneus*] *nubicus*) of southeastern and the Woodchat Shrike (*L.* [*P.*] *pomeranus*) of central and southern Europe are also migratory species, spending the summer in the above-mentioned areas and the winter in Africa. The former species has the upper parts deep black, with the scapulars and a broad band across the forehead and above the eye of pure white, while the under parts are white more or less washed with rusty. It is a somewhat shy and retiring species, frequenting in its summer home bush-covered plains, vineyards, and cultivated valleys

and feeding entirely on insects, more especially beetles; it is said to possess a pleasant, albeit somewhat monotonous, song. The compact nest is usually placed in a bush or olive tree and is so situated that it is shaded and covered by drooping leaves. The six or seven eggs are pale greenish gray spotted with dull brown or blackish. The Woodchat Shrike also frequents the open country and bushy fields, where it keeps more or less concealed amongst the foliage. Insects form its principal food, but a young or weakly bird is sometimes added, and like its near relative, it has a somewhat pleasing song at certain seasons. The nest, usually built in May, is a slight structure made of dried plant stems, often of some sweet-smelling species, and is ordinarily placed in a bush or fork of a tree.

African Crimson-breasted Shrike. The third subfamily (*Malaconotinæ*) as here accepted comprises a dozen genera and between ninety and one hundred species, all being confined to Africa. Of this wealth of forms lack of space will permit the mention of but few, among them the Crimson breasted Shrike (*Laniarius atrococcineus*) of South Africa. This is a beautiful species, about eight inches in length, the upper parts being a glossy blue-black with concealed spots of grayish white on the rump, while the wings and tail are black, the former with conspicuous white patches and the lower parts brilliant scarlet. It is a rather wary bird, usually found singly or in pairs, frequenting both open woods and dense thickets, but preferring the latter. In such situations it may be observed industriously searching for insects and their larvæ, and while "thus occupied occasionally utters pleasant, clear, ringing notes, but with the prelude a harsh guttural sound." It constructs a rather roughly made nest, without soft lining, of the inner bark of trees and a few grass stems; the eggs are white or greenish white spotted with light brown. The other forms of this genus (*Laniarius*), of which there are a large number, are widely spread over Africa and may be known by the presence of red, green, or yellow in the plumage.

Bacbakiri Shrike. — Another species perhaps worthy of brief mention is the Bacbakiri Shrike (*Pelicinius gutturalis*), so named from the likeness of its ringing call notes to the Dutch word *bacbakiri;* it is found in South Africa, ranging from Cape Colony to Natal and Benguela. About eight and a half inches long, the general color above is green, the crown, nape, sides of the neck, and ear-coverts gray, the lores black, and the throat, chin, and cheeks bright yellow, the same color extending in a narrow stripe from the nostrils over the eye; the lower parts are mainly yellow with a broad deep black crescent on the breast and a narrow band of black along the sides of the neck. In Damara Land, Mr. Andersson found it a very shy and retiring bird, plunging into the thickest part of the nearest brush the moment it found itself observed, and thence moving on as near to the ground as the locality will permit; but at the Cape it is a very familiar bird, frequenting the gardens and cultivated areas. "This Shrike," he continues; "feeds chiefly on insects, but it is said occasionally to kill and devour young birds; it hunts for its prey amongst low bushes and on the ground, and runs with great swiftness. It is usually found in pairs, but for some time after the breeding season the parents are accompanied by their families, which they tend with

much care." The nest is built in thick bushes and the four or five eggs are greenish blue spotted with reddish brown.

Thick-heads. — The final subfamily (*Pachycephalinæ*), which on some accounts is entitled to full family rank, is also a large one, compassing a little more than a hundred species disposed in some eight genera; it is widely represented throughout the Austro-Malayan and Polynesian regions. This differs from the last subfamily in having the soft nostrils in a groove and partly covered by small feathers and the nasal bristles; yellow is present in the plumage, but neither blue nor red; the sexes are generally different. One of the most peculiar members of the group is the Frontal Shrike, or Shrike-Tit (*Falcunculus frontatus*), of South and East Australia. It is a very animated and spritely little Tit-like bird, about seven inches in length, with a deep black erectile crest, the general color of the upper parts being greenish yellow more or less tinged with gray, and very bright yellow below; the throat and fore neck are deep black bordered by a narrow white stripe and this by a black stripe, which runs from the outer edge of the eye over the ear; the female is much smaller and has the throat green instead of black. Mr. John Gould, who enjoyed exceptional opportunities of observing this bird in its native haunts, states that it inhabits the thick brush as well as the trees of the open plain, seeking its food, which consists principally of insects, among the foliage or under the bark of the larger branches, and displaying in its dexterity and lively actions a striking similarity to the Tits. While thus employed it frequently erects its crest and assumes many pert positions, and he adds, "no bird of its size with which I am acquainted possesses greater strength in its mandibles, or is capable of inflicting severer wounds, as I experienced on handling one I had previously winged, and which fastened on my hand in a most ferocious manner." They build a round, cup-shaped nest and lay three or four eggs.

Nearly nine tenths of the species embraced in this subfamily are comprised in a single genus (*Pachycephala*) and are known as Thick-heads. Lacking the head crest characteristic of the last, the sexes are generally different in plumage, the principal colors of which in the male are brown, yellow, olive-green, and black, red and blue being always absent. They are small birds, mostly between six and seven inches in length, of quiet demeanor, hopping about the branches of trees or on the ground seeking their food, which consists largely of caterpillars, beetles, etc. Some of them possess a loud and rather pleasing song, while others merely emit a slow but frequently repeated whistling note. They make neat, round, cup-shaped nests and lay usually four eggs.

THE WOOD SHRIKES

(Family *Prionopidæ*)

Under the collective name of Wood Shrikes there has been segregated a small group of about ninety-five species — disposed among some sixteen genera — of mainly small, Old World, Shrike-like birds that at one time were considered a

subfamily of the *Laniidæ* and are still so considered by some authorities, as all have the hooked bill of the Shrikes. They are for the most part rather dull colored birds, with much of brown, gray, black and white, sometimes relieved, however, by chestnut, fawn-color, or yellowish. They mostly frequent trees and bushes, and while they may feed to a limited extent on fruits, mollusks, etc., they are mainly insectivorous, certain forms, such as the Indian Pied Shrikes (*Hemipus*), catching their prey entirely in the air, like the Flycatchers, which they otherwise resemble, while others search the leaves of trees, or hop easily over the ground. One of the most anomalous but most interesting forms is the so-called Magpie-Lark (*Grallina picata*) of Australia. It is a large bird, that is for the group, being ten or eleven inches long, the male being the longer. It is blue-black above, with the wing-coverts, a wing band, and the rump, upper tail-coverts and tail pure white, the latter tipped with black, while the sides of the head and neck are striped with white and black, and the cheeks, throat, and breast like the back, the remainder of the lower surface being pure white; the female is similar to the male, but has the frontal band and throat white. The Magpie-Lark is an attractive, tame, and familiar bird, very generally distributed throughout the island continent, especially in the vicinity of fresh water, such as the banks and muddy flats of lakes and swamps. It comes familiarly about the settlers' homes, where it may be seen running along the verandas and house-tops, and is considered one of the most useful birds, not only destroying great quantities of insects such as grasshoppers and beetles, but numbers of a species of land mollusk that is the intermediate host of the disease of sheep known as fluke. Its flight is peculiar, being performed in a straight line but with numerous heavy flappings of the wings; its note is a shrill, oft-repeated whining whistle. The nidification is remarkable and quite at variance with the habits of other members of the family or of Shrikes in general. They construct a large bowl-shaped nest of mud, which "soon becoming hard and solid upon exposure to the atmosphere has precisely the appearance of a massive clay-colored earthenware vessel," its outside dimensions being five or six inches and the egg cavity four and a half or five inches across and two and a half deep; it is sparingly lined with feathers and grasses. The nest is placed usually on a bare horizontal limb of a tree, often in an exposed situation and frequently overhanging water, and it is not an uncommon sight to see several in the same tree which have been used in successive seasons or for different broods. The old nests are frequently made use of by other birds such as Wood Swallows, Cuckoo-Shrikes, etc. The eggs, usually three or four in number, are pearly white, pinkish, or buffy red with markings of purplish generally zoned about the apex.

Pied Shrikes and Allies. — Without going extensively into the subject, a few selected from various parts of the group may serve to convey a fair impression of the family. Thus the Pied Shrikes (*Hemipus*), of which there are four species ranging from the Himalayas through the Indian and Malay peninsulas to Java and Borneo, are birds about five and a half inches long, with a mixed plumage of black or brown and white. They are generally to be observed perched on the summit of tall trees, whence they launch forth for their insect prey. Their nests,

usually placed in low trees, are shallow, cup-like structures of fine grass and roots, covered outside with cobwebs, bits of leaves, and lichens; the eggs, two or three in number, are pale greenish white marked with brown. Southeastern Asia and the adjacent islands is the home of another small genus of arboreal Shrikes (*Tephrodornis*), which differ from the last in having a square instead of a graduated tail. They are mainly gray in coloration, and Mr. Oates states that the Indian species are more or less gregarious, occurring in small bands of from four to six individuals, more rarely in pairs. They never descend to the ground nor do they catch insects on the wing, but search industriously for them on the leaves and branches of trees, hence they are only found in forests or well-wooded districts. Of the three Indian species the common Wood Shrike (*T. pondicerianus*) is best known, being ashy brown above and ashy below with a broad white stripe over the eye, the rump tipped with white as are the two outer pairs of tail-feathers, and the lores and cheeks dark brown; the length is about six and a half inches. This species constructs on the branch of a tree a very beautiful nest of vegetable fibers and roots, coating it thickly with cobwebs and bits of bark, and deposits therein usually three eggs, which are white marked with purple and brown.

Jay-Shrikes. — Whereas in the preceding genera the head is not crested, in a small but striking genus, the members of which are appropriately known as Jay-Shrikes (*Platylophus*), the head is provided with a remarkable erect crest of long, broad feathers, which is longer than the head itself. The Jay-Shrikes are about eleven inches in length and are further marked by possessing a very short and curved, notched bill, very rounded wings, and a large, well-graduated tail; the four species range from the Malay Peninsula to Sumatra and Borneo. The Indian Jay-Shrike (*P. ardesiacus*) has the whole head dark brown, the remaining upper parts olive-brown, and the lower parts dark slaty brown or dark olive-brown, while the sides of the neck bear a large spot of white. This is a very restless, active bird, frequenting the dense evergreen forests, where it is usually observed in pairs; its note, according to Mr. Oates, is a sharp, metallic rattle.

Shrike-Thrushes. — Although Africa is the home of a considerable number of Wood Shrikes, the metropolis of the group appears to be Australia, New Guinea, and the adjacent islands, where almost every island supports a form; but as they do not possess any particular interest, we may pass them over with the exception of a small Australian genus, the members of which are those known as Shrike-Thrushes (*Colluricincla*). They are rather plain-colored birds, between nine and ten inches long, the principal colors being gray or brownish on the upper surface and grayish white or fawn-color beneath. The best-known species is perhaps the Gray or Harmonious Shrike-Thrush (*C. harmonica*), which is distributed quite generally throughout Australia and is regarded as one of the best songsters of that country, indeed often compared with the Nightingale. It is a very active bird, living much among the branches of trees and feeding upon insects of various kinds, caterpillars and their pupæ, and while engaged in search for its food pours forth its song, which consists of a number of powerful swelling

notes. It places its nest, which is deeply cup-shaped and composed of strips of bark and lined with rootlets and grass, in a great variety of situations, such as a hollow stump, a thick bush or clump of foliage, or on a ledge of a decayed branch, a niche in a bank or a ledge of rock, and sometimes in the nests of other birds; the eggs are usually three, though occasionally four or even five are found; they are glossy, pearly white, blotched and spotted with olive and dull slate color.

African Helmet Shrike. — From the typical genus (*Prionops*), or that upon which the family is based and which is confined to Africa, we may select a single species, — the South African Helmet Shrike (*P. talacoma*). About eight inches in length, it has the upper parts a glossy greenish black and the neck and under parts pure white, while the head is a light pearl gray, the cheeks white, margined behind by a crescent of black, and the two outer tail feathers pure white; the bill is black and the legs pale yellow. Of its habits as observed in Damara Land, Mr. Andersson says: "It is always seen in flocks of from half a dozen to a dozen individuals, which frequent spots, where they restlessly hop from branch to branch on the bushes and lower boughs of trees, never remaining long on the same tree, but hunting most systematically for insects, which, with the occasional addition of young shoots and leaves, form their food."

THE HELMET-BIRDS

(Family *Aërocharidæ*)

After various classificatory vicissitudes which have successively placed it among or near the Toucans, Hornbills, Swallows, Crows, Starlings, and Shrikes, the peculiar Helmet-bird of Madagascar (*Aërocharis prevosti*) has finally and probably correctly come to be accorded a family by itself and just succeeding the last-named group. It is a bird of rather striking appearance, about twelve inches long, with a large, compressed, swollen, and hooked bill, which is nearly, or in the female quite, two inches long; the bill is not solid but filled with a spongy tissue which is pearly white in color. In the male the bill is bright steel-blue in life, while in the female it is lighter in color and has the tip black. The sexes are somewhat different in plumage, the male having the head and neck velvety black with a purplish blue gloss; while the back, including the scapulars and wing-coverts, are bright bay and the tail black with the exception of the two central feathers, which are like the back; the under parts are black with narrow, indistinct bars of fulvous. The female has the lower parts thickly barred with fulvous. According to Grandidier, the Helmet-birds frequent the vast forests, where, in parties of three or four, they fly rather heavily from branch to branch and from tree to tree. They are entirely insectivorous, feeding especially upon beetles and orthoptera. As a matter of fact very little is known regarding the life history of this peculiar bird, its manner of nest building and caring for the young being apparently unknown.

Fig. 206. — Helmet-bird, *Eurocharis prevosti*.

THE VIREOS

(Family *Vireonidæ*)

The Vireos, or Greenlets, as they are often and perhaps more appropriately called, constitute a small group of upward of a hundred species and subspecies disposed in some eight genera. They are confined exclusively to the New World, having their maximum development in the tropics, whence they range in gradually decreasing numbers throughout practically all of the temperate regions. They are small, active, arboreal birds with a dentirostral bill which is notched in both mandibles, a variable wing, which, however, is always longer than the tail and in which the outer primary is very short or sometimes rudimentary and concealed (then practically nine-primaried), while the nostrils are partly exposed and the rictal bristles usually inconspicuous. As additional characters it may be mentioned that the tail is usually rather short and composed of rather narrow feathers, the tarsus short and robust, and distinctly scutellated in front, while there is a considerable amount of cohesion of the front toes. The coloration is somewhat variable, though they are never streaked, spotted, or barred, the prevailing hues being plain olive, olive green or gray above, and plain whitish or yellowish below. The wings are often white-banded, and there is sometimes bright green and yellow, rarely blue, on the head. A white or yellow orbital ring occurs in certain forms, and others are marked by the possession of white, red, or yellow eyes. The Vireos are preëminently birds of the open forest, but they also frequent the trees in parks and along village streets, swamps, and the taller undergrowth along streams, going about in pairs or more often singly and keeping mainly to the upper branches, where they hunt industriously for their food or gambol about in their play. As a rule they are fair songsters, though, as Mr. Ridgway says, "some species are distinguished by the oddity rather than the melody of their notes," and, within certain limitations, each kind has its own musical accomplishment. They are mainly insectivorous, though feeding to some extent on fruits and berries. So far as known they all build one style of nest, and this a "rather slight and thin-walled, but neat and compact, pensile cup-like structure, suspended from the fork of a twig," sometimes but a few feet from the ground, at others high up in a tree. The eggs are uniformly white with a few dark specks.

As regards the affinities of the *Vireonidæ* there are some differences of opinion. Largely on account of the stout-hooked and notched bill they were formerly included with the Shrikes (*Laniidæ*); but all things considered, they seem best placed near the Waxwings (*Ampelidæ*).

Red-eyed Vireo and Relatives. — Although several generic names have been in use at various times, it has been the custom in recent years to include the majority of the forms in the genus *Vireo*, but in his revision of the North and Middle American forms Mr. Ridgway has found it expedient to recognize three genera. Of these *Vireosylva* may be first mentioned, its members being small or medium-sized Vireos, with the tenth primary

rudimentary and concealed or in any event not more than one third the length of the ninth, while the coloration is plain olive, olive-green, or grayish above and whitish or yellowish beneath, the wings being without white bands or other markings. One of the commonest and most widely distributed is the Red-eyed Vireo (*V. olivacea*), which is found throughout temperate North America in general, except the arid districts, and may be known by its red eye, above which is a black-bordered white line. Too well known to need further description, the Red-eye comes to our shade trees, orchards, and woodlands as an ever welcome visitor, its peculiar but pleasing, albeit monotonous, song being incessantly given, even during the heat of the long summer days when few other birds are singing. "Though constantly talking," says Wilson Flagg, "he takes the part of a deliberate orator, who explains his subject in a few words and then makes a pause for his hearers to reflect upon it. We might suppose him to be repeating moderately, with a pause between each sentence, 'you see it — you know it — do you hear me? — do you believe it?' All these strains are delivered with a rising inflection at the close, and with a pause, as if waiting for an answer." Other species of the genus are the Philadelphia Vireo (*V. philadelphica*) of eastern North America, which has the under parts olive yellowish, and the Warbling Vireo (*V. gilva*) of eastern temperate North America, which is replaced in the western area by its subspecies (*V. g. swainsonii*).

Yellow-throated and Solitary Vireos. — Very similar to the last genus, but possessing a relatively shorter and stouter bill and wings with two conspicuous white bars, is the genus *Lanivireo*, which embraces three species, of which the Yellow-throated Vireo (*L. flavifrons*) of eastern North America may be taken as typical. This species, which may be known by the absence of the spurious (tenth) primary, olive-green back and hind neck, and bright yellow throat and chest, is very like the Red-eye in habits, except that it keeps more to the upper portions of the trees, and has a similar but more deliberate song. The only other North American species is the Solitary Vireo (*L. solitarius*), which has the spurious primary well developed but lacks the yellow on the chest. It is found in eastern North America, and in four or five subspecies spreads over the major portion of southern and western United States.

White-eyed Vireo. — Differing from the last two genera in having the tenth primary well developed — being more than one third the length of the ninth — is *Vireo* with its many species and geographical races, one of the best-known being the White-eyed Vireo (*V. noveboracensis*) of the eastern United States. It is plain greenish olive or dull olive-green above, the wings with two distinct yellowish white wing-bars, and dull white tinged with yellow laterally and on the breast below; the irides are white, whence of course its name. The White-eye is abundant in suitable localities, such as hazel thickets, blackberry patches, bushy swamps, etc., "where its presence is made known by its vociferous notes, which in loudness appear out of all proportion to the size of the little creature which produces them. These notes are remarkable for their oddity as well as for their strength, being variously interpreted as '*ginger-*

Fig. 207. — Warbling Vireo, *Vireo gilva*. Philadelphia Vireo, *Vireo philadelphica*.

beer, — quick,' 'chick'ty-beaver, — lim'ber stick,' etc."—RIDGWAY. Their nests are elegant specimens of bird architecture, being deeply pensile, composed of soft mosses, lichens, and other substances, and suspended from the forks of a twig, usually at a height of from three to five feet from the ground.

Of the remaining genera in which the legs and feet are stouter and the lateral toes nearly equal in length, *Pachysylvia*, which embraces nearly thirty forms, has short and rounded wings, a smaller, somewhat conical bill, and the coloration of the head more or less different from that of the other portions; they are natives of Central and South America. Their habits do not greatly differ from those of *Vireo*, though of the Gray-footed Pachysylvia (*P. griseipes*) of Margarita Island, Venezuela, Robinson says that it is found usually in the cactus hedges along the roads, where its actions seem much like those of our Maryland Yellow-throat. The brightest-colored members of the family are comprised for the most part in the genus *Cyclarhis*, which has the strong, laterally compressed bill much shorter than the rest of the head, the principal colors of the plumage being green, chestnut, and yellow, the latter occurring on the under parts. The only species we may mention is the Ochre-headed Greenlet (*C. ochrocephala*) of Brazil and Argentina. It is olive-green above with the cap brownish ochraceous, cheeks clear gray, throat grayish white, and under parts yellow; its length is seven inches. In his "Birds of the Lower Uruguay," Barrows says: "The bird's favorite haunts seem to be the tangled thickets and low woods which border the streams. Here, walled in by netted masses of jasmine, sarsaparilla, and the passion flower, there was little fear of interruption, and the male was often heard pouring forth his strong, clear warble with an energy which always suggested a bird twice his size."

THE NUTHATCHES

(Family *Sittidæ*)

There are differences of opinion as to what shall be included within the limits of this small group as well as regards their affinities and position, some writers placing them with the *Certhiidæ* (Creepers), others with the *Paridæ* (Titmice). They are undoubtedly related to both these families, but especially with the latter, yet they possess characters which seem to entitle them to full family rank, and this is perhaps best expressed by placing them near the latter group. They are stocky little birds, mostly between five and seven inches in length, with a subcylindrical, slender, acute bill about as long as the head, long, pointed, "ten-primaried" wings, a short nearly even tail of twelve soft, broad feathers, a short tarsus which is scutellate in front and composed of two entire longitudinal plates behind, and a very long hind toe, while the front toes are very unequal in length. They are highly scansorial birds, climbing with the greatest facility about the trunks of trees or the faces of cliffs, assuming all manner of positions, but never making use of the tail as a support as do the Woodpeckers and others. They appear rather to "hug" the tree or rock upon which they cling, and no climbing birds

are more nimble or active than they. Their plumage is compact, ordinarily of plain colors, the prevailing hues being light slaty blue or bluish gray above, the top of the head often different, and whitish, rusty, or buffy below; the sexes are alike or but slightly different in coloration, and the young resemble the female.

While not strictly gregarious the Nuthatches are sociable birds, usually observed in pairs or small troops and often in attendance on the miscellaneous assemblages of Warblers, Titmice, and Kinglets met with in the woods. Most of the species frequent woodland, especially the high, open forests, and are oftener seen on large trees than on undergrowth, though certain Old World forms inhabit more open, treeless country where they frequent rocks and cliffs. They are in almost constant motion, running up and down the trunks of trees and peering into every crack and crevice for their food, which consists principally of insects and their larvæ, although they also subsist to a considerable extent on nuts such as the beechnut, which they wedge into a crack in the bark and reduce by repeated blows of the bill, whence their name, —a supposed corruption of *Nuthack*. They are generally very tame and unsuspicious birds, allowing a near approach of man, and during the cold months often coming to the vicinity of habitations to feed upon scraps of meat thoughtfully placed for them. The Nuthatches have nothing that can be properly called a song, their voice being mostly harsh, abrupt, and unmelodious, though the notes of some of the Old World representatives are described as a "clear, ringing trill." In the typical forms the nests are placed in a cavity, usually a hole in a tree, but also in crevices in rocks, the nest proper being made of hair, feathers, leaves, etc. Most of the Old World species wall up the entrance with mud, having only an opening barely large enough for them to slip in by; while others, as the Rock Nuthatch, make a more or less cone-shaped nest entirely of mud; none of the New World forms employs mud in the nest building. The eggs are usually from five to eight in number, white or creamy white speckled with reddish brown. The Nuthatches are mostly resident where found, though some of the more northern species move slightly southward in winter.

The *Sittidæ* as here restricted embrace about sixty species and subspecies included in four genera, and are distributed pretty well throughout the world except in the neotropical and Ethiopian regions. The typical Nuthatches, numbering some forty forms, are comprised in the genus *Sitta*, which is characterized by having the mantle and back bluish gray. Of these, four species and half a dozen subspecies are natives of North America, only one reaching as far south as southern Mexico. Perhaps the commonest and best-known is the White-breasted Nuthatch (*S. carolinensis*) of the eastern United States and the British provinces, where it is generally resident throughout the year; it is known by having the top of the head and the upper part of the back shining black, and the sides of the head and the under parts white. Its familiar, hoarse cry of *yank, yank*, often the first notice of its presence, is heard in open woods and orchards. Its five geographical races carry the species over practically the whole of the United States and Mexico. Somewhat similar but distinguished at once by its much smaller size and the presence of black and white stripes on the side

of the head and rufous under parts, is the Red-breasted Nuthatch (*S. canadensis*), which ranges over the whole of North America, but breeds mainly north of the United States; it is rather partial to pine forests, but its habits are otherwise similar. In the South Atlantic and Gulf States occurs the Brown-headed Nuthatch (*S. pusilla*), which is known by its brown cap and diminutive size, while equally small and in many respects the most engaging of all is the Pygmy Nuthatch (*S. pygmæa*) of the western United States. It is the most sociable and gregarious of all the American species, going about except at the nesting season in flocks of from a dozen or twenty to often as many as fifty or a hundred, "straggling from tree to tree with desultory flight, calling incessantly to each other as if to make sure that all the company keep together." Their food consists of minute insects which lurk in the crevices in the bark, as well as the seeds of conifers.

Fig. 208. — European Nuthatch, *Sitta cæsia*.

One of the best-known of the Old World species is the Common Nuthatch (*S. cæsia*) of central and western Europe, and the only one reaching the British Islands. About five and a half inches in length, it has a black stripe through the eye, separating the bluish gray of the upper part of the head from the white cheeks and throat, the under parts being plain buff. It is one of the favorite birds of the English people, its high-pitched, clear, ringing note being frequently in evidence, especially in spring. For a nesting site it selects a hole in the trunk or branch of a large tree, and if the entrance be too large it is walled up with clay; the eggs number from five to seven. As most of the remaining species show but minor differences in both plumage and habits, we may pass to a consideration of the Rock Nuthatch (*S. neumayeri*), which is not conspicuously different from the Northern Nuthatch (*S. europæa*) in plumage, but differs widely in habits. A native of Dalmatia and Greece, whence it ranges through Asia Minor to northern Persia, it shuns the forested region and makes its home amongst rocks, over which it runs with the same facility as do the tree-haunting forms on tree-trunks. For a nesting site it selects a slight hollow or recess on the face of a cliff usually facing the sun, in front of which it constructs a covering of mud and carries it out in the form of a cone for a distance of several inches. The nest, Mr. Tracy says, "is naturally as inconspicuous as the ashy colored Nuthatch on his gray limestone hunting ground, but he sometimes boldly adorns it with trophies of the chase in the shape of bright wings of moths attached while the plaster is fresh." Within, the nest is lined with the hair of various animals, the down of plants, etc., and contains from six to ten eggs.

Distinguished from the typical Nuthatches mainly on the ground that the back and mantle are blue instead of slate-gray is the Old World genus *Den-*

drophila, which embraces at least eight species. Of the several species inhabiting various parts of India, the Velvet fronted Blue Nuthatch (*D. frontalis*) is a handsome little bird about five inches in length, the entire upper parts being a beautiful purplish blue and the lower parts grayish lilac, while the forehead and a stripe over the eye are velvet black, and the chin and throat whitish. It is a widely spread species, frequenting well-wooded localities and forests in both hills and plains. The nest is placed in a tiny hole in a tree, but the entrance is not walled up as are the nests of so many of the other Nuthatches; within it is lined with feathers, moss, and hair; the eggs are generally four in number.

Allied to the above is the monotypic *Daphænositta miranda* of southeastern New Guinea.

In the final genus (*Neositta*), the ten species of which are confined to Australia and New Guinea, the bill is curved slightly upward, the wings extremely long and pointed, and the plumage mainly brown in color with the middle third of the wing-quills either rusty or pure white. They are active birds though of rather weak flight, going about in small parties, and running up and down the trunks of trees with the utmost rapidity. They do not nest in cavities as do the other Nuthatches, but construct a small nest of short strips of bark attached together and fastened to a branch with cobwebs, the branch usually being the highest and most slender in a tall tree; the eggs are usually but three in number.

THE CORAL-BILLED NUTHATCH

(Family *Hypositttidæ*)

Sole tenant of its genus and family, the curious little Coral-billed Nuthatch (*Hypositta corallirostris*) of Madagascar constitutes another example of the many more or less anomalous bird forms that find, or once found, a home in that far-away island. It has usually been placed with the typical Nuthatches (*Sittidæ*) and also seems to exhibit leanings toward the Old World Flycatchers (*Muscicapidæ*), but characters have recently been discovered which appear to entitle it to full family rank. The coral-red bill is shorter than the head and broader than high, being slightly notched at the tip, while the wings are rounded and the tail nearly square. The most important structural character is afforded by the feet, the hind toe without the claw nearly equaling the middle toe, while the outer toe is very nearly as long as the middle one and united to it for a distance of nearly two joints. The hind neck and remaining upper parts are dull blue with a greenish tinge, the lores and chin white, and the head and lower parts dull slaty brown; the length is slightly under five inches. This bird inhabits the large forests, frequenting especially the damp ravines, when after creeping spirally up the trunk of one tree it flies down to the base of the next to search it in a similar careful manner. It lives silently and singly or in pairs, and although at present unknown, its nests and eggs probably do not differ greatly from those of its near relatives.

FIG. 209. — Coral-billed Nuthatch, *Hypositta corallirostris*.

THE TITMICE AND CHICKADEES

(Family *Paridæ*)

Chick-a-dee, chick-a-dee, dee, dee, quaintly calls an industrious grayish little bird, hanging head downward from the extremity of a slender branch, and *chick-a-dee, chick-a-dee, dee,* reply his dozen equally active companions. This familiar bird, too well known to need extended description, may be taken as a typical representative of the present family, which, according to latest authority, comprises more than twenty genera and over two hundred forms, and ranges practically throughout the entire world with the exception of the neotropical region and the Pacific islands. The *Paridæ* are all small birds, mostly under seven inches in length, usually non-migratory and mainly insectivorous, though feeding to some extent on a variety of things. They have a long, soft, lax plumage, the color of which is usually dull or plain, the principal tints being white, black, yellow, and blue, there being frequently spots on back or wings but never bars in any part of the plumage; the sides of the head are often colored differently from the rest of the head, and the crown feathers are not infrequently prolonged into conspicuous crests; the sexes are generally alike in plumage and the young usually paler than the adults, but retaining their color pattern. Structurally the Tits have a short, stout, more or less conical, unnotched bill, which is about one third the length of the head, and short rictal bristles, while the nasal feathers are directed forward, usually concealing the nostrils; the wings are short and rounded, but the tail varies in length and shape, being short and square in the typical members and long and graduated or even emarginate in others.

The general characteristics of the family have been so ably set forth by Dr. Coues that I cannot refrain from giving his account in full. "A strong family likeness runs through the whole of them, and their habits and manners in most respects are much the same. The principal exception to this statement is found in the methods of nidification, which vary greatly, some species building in holes of trees, which they excavate like Woodpeckers, while others construct immense purse-like pensile nests of grasses or mosses. They are for the most part hardy birds, capable of enduring great cold with impunity. Their musical ability is decidedly of a low order, though they have a great variety of hearty and not displeasing notes. They are very active, restless, energetic, and industrious birds, withal turbulent, self-asserting, and in the presence of man heedless to a degree. Among their own kind they are sociable, in some cases almost gregarious, but they are accused of being tyrannical and cruel, like Jays, toward weaker or more defenseless species. They are very prolific, not only laying a large clutch of eggs, but often rearing more than one brood annually; as a consequence, they are unusually abundant wherever found at all. They are chiefly confined to wooded country, the boreal species of America haunting coniferous forests, while others, for the most part, prefer thickets, shrubbery, and undergrowth."

There have been, and perhaps still are, some differences of opinion as to the rank and position of this group. Mr. Oates boldly places them as a subfamily among the Crows and Jays (*Corvidæ*), to which they are undoubtedly allied, but from which they are distinguished by having the first primary never more, and usually less, than half the length of the second. The *Paridæ* is usually made to include the Nuthatches (*Sittidæ*) and Wren-Tits (*Chamæidæ*), but all are here considered as entitled to full "family" rank.

Typical Titmice. — The typical Titmice to the number of more than a hundred forms are embraced in a single genus (*Parus*), or, if we are to follow the most recent authority, in some twelve or fifteen genera into which this genus has been broken, often it would seem on very slight grounds. In its wider acceptance the genus is represented in North America by some ten species and an equal number of geographical races, all being plainly colored, grayish or brownish above, and whitish or rusty beneath, perhaps the best-known being the common Chickadee (*P.* [or *Penthestes*] *atricapillus*) of eastern North America north of the Potomac and Ohio valleys, which has the top of the head, nape, and throat shining black. Throughout much of its range, but especially in New England, it is a common and familiar bird, usually shunning the vicinity of human habitations during the nesting season, but in winter coming about orchards and gardens in larger or smaller flocks. Its favorite haunts are the edge of woods, where it finds both food and shelter to its taste, its cheery call of *chick-a-dee* so plainly announcing its name that all who hear may know. It is a very tame and confiding not to say inquisitive bird, coming at a whistled imitation of its note to investigate the newcomer and not infrequently to alight on his outstretched hand. The nesting site is usually a tiny hole excavated in a decayed stump, sometimes a hole in a tree, and rarely a crevice about buildings. The nest is composed of soft felted materials such as fine grasses, moss, feathers, or hair, and the eggs, five to eight in number, are white spotted with reddish brown. In the Rocky Mountain district occurs a paler, much longer-tailed race known as the Long-tailed Chickadee (*P. a. septentrionalis*), and in the northwestern coast district a smaller and darker-colored race, — the Oregon Chickadee (*P. a. occidentalis*).

Fig. 210. — Black-capped Chickadee, *Parus atricapillus*.

Carolina Chickadee and Allies. — Differing from the last species in its smaller size, the absence of whitish edgings to the wing-coverts, and more extensively

black throat is the Carolina Chickadee (*P. carolinensis*) of the southeastern United States. It has somewhat lower, more plaintive notes, but otherwise the habits are essentially similar to those of its more northern relative. There are two other species in which the head and throat are black, — the Mountain Chickadee (*P. gambeli*) of the mountains of the western United States, and the Mexican Chickadee (*P. meridionalis*) of the highlands of Mexico, the first having, and the second lacking, a white superciliary stripe.

With the top of the head brownish and the back hair-brown or grayish brown is the Hudsonian Chickadee (*P. hudsonicus*) of the western half of British America. It is even tamer and more unsuspicious than the one first mentioned, and has quite different notes, but otherwise the habits are practically identical; it is represented by slight geographical races in eastern Canada and northern New England, Labrador, Alaska, and the Rocky Mountains. Also belonging to this brown-headed group is the Chestnut-backed Chickadee (*P. rufescens*) of the Pacific coast from Oregon to Alaska; it is similar to the last as regards habits and appearance except for the chestnut-colored back and smaller size.

Fig. 211. — Great Titmouse, *Parus major*.

Old World Titmice. — Passing over the crested Titmice for the moment, we may note some of the Old World representatives of this vast genus, beginning with a group in which the principal colors are black and yellow, with blue or white showing more or less conspicuously in the plumage. Of these the Great Titmouse, or Oxeye (*P. major*), is a familiar bird throughout Europe generally, being olive-green above with the head, throat, and a broad breast band of glossy black, while the cheeks and a spot on the nape are white and the breast and abdomen yellow. Mr. Dresser says it is a lively and active bird, frequenting "gardens, orchards, and woods, feeding chiefly on insects and their larvæ, to some extent also on seeds, and will attack and kill small and weakly birds, open their skulls and devour the brain. In winter they collect in small family parties and rove about the country. The nest is placed in the hole of a tree or wall, or any similar suitable place, and is usually bulky, consisting of a foundation of dry moss or grass on which is a soft bed of hair, wool, or feathers, and the eggs, which are generally deposited in April, vary from six to ten in number, and are white, spotted and blotched with reddish." To the eastward this gives place to the smaller Japanese Titmouse (*P. minor*), which has the under parts white with a creamy tinge.

The **Black-and-white Tit** (*Parus* [*Pentheres*] *niger*) of the southern Ethiopian region may be selected as an example of a group in which the plumage is glossy black, this particular species being further marked by having the primaries and wing-coverts conspicuously edged with white. Mr. Andersson found it in Damara Land generally in pairs, searching among the larger trees for insects and their larvæ, and also notes that it sometimes feeds on seeds.

Blue Titmice. — White and blue are the dominant colors in another group (*Cyanistes*), of which the handsome Blue Titmouse (*P. cæruleus*) may be selected as an example. Only four and a half inches long, it has the back yellowish green and the wings and tail bluish, while the crown is bright blue encircled with white, the cheeks white bordered with blue, and the breast and abdomen lemon-yellow, traversed along the middle of the abdomen by a dark bluish line. Ranging throughout Europe generally, it is even better known and more highly prized than the Great Titmouse, frequenting gardens and orchards near human habitations, and exhibiting in extreme degree the characteristics which make the Tits so engaging. It is an active, restless, cheerful bird, gathering in small flocks after the young are reared and wandering about during the winter in company with the other Titmice and Goldcrests, or not infrequently migrating to the southward. It has, says Mr. Hudson, the power to assume an endless variety of graceful positions when clinging to the slender branches and twigs, upright or pendulous, of the leafless trees in winter, and always attracts admiring attention. The nest is placed in a great variety of situations, such as a hole in a tree or wall, a nesting box, or rarely in a hole in the ground, and is composed of moss, wool, and feathers; the eggs, "from seven to twelve or fourteen, or occasionally even more," are white spotted with pale red. In northwest Africa it is replaced by the Algerian Blue Titmouse (*P. ultramarinus*), which has all of the blue portions of the plumage of a darker hue, while in central and eastern Russia occurs the related Azure Titmouse (*P. cyanus*), a strikingly beautiful bird with the head snowy white, the back bluish gray, the wings grayish brown, the outer webs of the feathers Prussian blue tipped with white and the long tail bright blue, the outer feathers and tips white, while the under parts are white with a small patch of bluish black in the middle of the breast. This species does not frequent forests, but is usually found in damp places such as willow thickets along streams, and is as active and restless as the majority of Tits. It has a great variety of notes, especially call notes, and is stronger on the wing than most of its kin. The nest is usually placed in a hole in a willow tree and the eggs often number ten or eleven.

Coal and Marsh Titmice. —Much plainer in plumage and falling near the group which embraces the American species already mentioned, is the Coal Tit (*P. ater*) of Europe generally, which has the upper parts gray, the wings with two white bands, and the crown, throat, and fore neck black, while the cheeks and nape are pure white and the lower parts white tinged with gray. More nearly allied with the American species and in fact belonging to the same group is the well-known Marsh Tit (*P. palustris*), which in a great number of geographical races is spread over almost the whole of Europe and Asia.

Crested Titmice. — We may now return to the members of the group in which the head is adorned with a more or less conspicuous crest, all of which were formerly and by many are still included within the limits of the genus *Parus*. One of the best-known American species is the Tufted Titmouse (*Parus* [*Bæolophus*] *bicolor*) of the eastern United States, chiefly south of 40°. The entire upper parts including the crest are gray, the forehead black, and the lower parts whitish becoming rusty on the flanks. The Tufted Titmouse is quite generally distributed throughout woodlands, where its presence is known by its loud, clearly whistled notes, which resemble the syllables *peto, peto, peto, peto*, and are often repeated for hours at a time, until, as Mr. Chapman says, "the bird finally wearies one by its monotonous repetition." It is ordinarily a tame, unsuspicious, and inquisitive bird, gathering in small flocks in winter and often coming into orchards and gardens, but among themselves they are rather quarrelsome. The nest is always placed in a cavity, especially the abandoned hole of a Woodpecker or sometimes nesting boxes about homes, and is lined with grasses, moss, strips of bark, and feathers. The five to eight eggs are creamy white, rather coarsely spotted with reddish brown. Similar to the above, but having the crest and entire crown deep black, is the Black-crested Titmouse (*P.* [*B.*] *atricristatus*) of eastern Mexico, whence it ranges northward into southern Texas. Along the Pacific coast of California and western Oregon occurs the Plain Titmouse (*P.* [*B.*] *inornatus*) which is brownish above and has the top of the head grayish; two other lighter races inhabit Lower California and the southwestern states, respectively. The other American species is the Bridled Titmouse (*P.* [*B.*] *wollweberi*), so called from the presence of a black stripe on the side of the head and a black collar and throat; it ranges from the table-lands of Mexico into the adjacent United States.

The best-known Old World representative of the Crested Tits is the Crested Titmouse (*P.* [*Lophophanes*] *cristatus*) of northern and eastern Europe, being not uncommon in parts of Scotland, but rare in England. It is evidently a wilder, shyer bird than our Tufted Titmouse, frequenting coniferous woods, birch woods, and alder swamps where evergreen trees are near, and rarely coming about habitations even in winter. It feeds largely upon insects and their larvæ, but also on seeds, fruits, and berries, much oftener visiting the ground than most of its congeners, and wandering widely in search of its food except during the nesting season. It has a loud, clear voice, the notes resembling the syllables *kirr, kirr,* or *kirrit*. The nest is usually placed in a hole in a tree, the bird either excavating one for itself or making use of an old Woodpecker's hole, but sometimes possession is taken of abandoned Crows' or Magpies' nests. The five or six eggs are white boldly spotted with bright reddish brown. As regards coloration, the Crested Titmouse is brown above and white faintly tinged with brown beneath, the long, pointed crest being black edged with white, and the chin and throat deep black.

Himalayan Sultan Bird. — Brief mention should be made of a very striking bird of the eastern Himalayas, known as the Sultan Bird (*Parus* or *Melanochlora sultanea*). About eight inches long, it has the entire upper plumage, including the head and breast, deep black, the head set off by a long, pointed

crest of brilliant yellow, which color is also present on the lower parts back of the line of the breast. It is usually observed in small flocks among the higher trees. Southeastern Asia is also the home of another group of bright-colored Crested Tits (*Machlolophus*).

Bush Tits. — While all members of the family thus far treated have at one time or another been referred to a single genus (*Parus*), we have now come to a series that, while not very widely removed, are usually considered sufficiently distinct to merit independent generic rank, among them the Long-tailed Tits of the Old World and the Bush Tits of western North America. The latter (*Psaltriparus*) are delicate little soft-plumaged birds, only four or four and a half inches long, with the upper parts plain grayish or brownish and the lower parts light grayish, grayish white, or brownish white, the crown usually differing slightly in color from the back; five or six species are recognized. They are engaging little sprites, frequenting scrubby oaks on hillsides and tangled undergrowth along streams and in ravines, and are bubbling over with energy and good nature. Dr. Coues, who enjoyed abundant opportunity of studying their habits, says: "They are extremely sociable; flocks of fifty — some say even a hundred — may be seen after the breeding season has passed. Often in rambling through the shrubbery I have been suddenly surrounded by a troop of these busy birds, perhaps unnoticed till the curious chirping they keep up attracted my attention; they seemed to pervade the bushes. If I stood still, they came close around me as fearless as if I were a stump, ignoring me altogether. At such times it was pleasant to see the earnestness with which they conducted affairs, and the energy they displayed in their own curious fashion." But engaging habits do not by any means exhaust their attractiveness, for they are among the most skilful of architects in the matter of nest building, constructing a bulky purse-shaped nest suspended from twigs, usually at no great elevation from the ground. It is composed of mosses, lichens, fibers, ferns, and grasses, and lined with a profusion of soft feathers, wool, etc., with the entrance a small circular opening usually at one side near the top. A typical nest may measure twelve inches in length by four and a half inches in diameter at the bottom and three inches at the top. The eggs, which may number from five to nine, are pure white without markings.

Verdin. — Akin to the Bush Tits and formerly included with them is the curious little Verdin (*Auriparus flaviceps*) of the arid regions of northern Mexico and the adjacent portions of the United States. Nearly as small, but much more stoutly built, it is distinguished by having the upper parts plain grayish and the under parts grayish white, the head, neck, and chest bright yellow and the lesser wing-coverts rich chestnut-red; the female is similar to the male but usually somewhat duller. They frequent the dense chaparral and cactus thickets of the desert regions and construct a bulky globular or flask-shaped nest composed of sticks, thorny twigs, coarse grasses, etc., lined with soft feathers, down, and the like. The nest is placed in bushes, usually but a few feet from the ground, and has the entrance a small round hole in one end or side; the three to six eggs are pale greenish blue dotted with reddish brown.

Long-tailed Tits. — The so-called Long-tailed Tits of the Old World number twenty-five or more forms, and are apparently referable to two genera, though formerly included in one. They are closely related to the Bush Tits, though with shorter bills, and like them construct large globular or purse-shaped nests with the entrance near the top. While none of them is very bright colored, there is a pleasing disposition of the color pattern, the White-headed Long-tailed Tit (*Ægithalus caudatus*) of Europe, for example, having the head throat, and breast snowy white.

THE ORIOLES

(Family *Oriolidæ*)

Although often dressed in a somewhat similar livery of yellow and black, the Old World Orioles should not for a moment be confounded with birds frequently so called in the New World (*i.e.* American Orioles, *Icteridæ*), for, as Dr. Stejneger says, the two groups are structurally as different as a Crow and a Warbler. Their nearest relatives are among the Crow-like birds, while the American Orioles are closest to the Finches and Tanagers. The *Oriolidæ* are medium-sized *Oscines*, mostly between nine and twelve inches in length, with a rather strong bill about as long as the head, and straight or slightly curved to the tip, where the upper mandible is notched; the nostrils are bare; the long pointed wings contain ten primaries, of which the third and fourth are longest, while the moderately long and slightly rounded tail has twelve rectrices; the tarsus is short and the toes rather small, free at base and with long, curved claws. The sexes are generally different in plumage, that of the nestling being streaked.

Mainly tropical in distribution, the Orioles are spread over the whole of Africa, and the Indian, Malayan, and Australian regions, with three species extending into the Palæarctic region, one of which, the well-known Golden Oriole, is found over Europe generally as well as a portion of southwestern Asia. They are generally bright-plumaged birds, the prevailing colors being yellow, olive-green, and black, occasionally with a dash of crimson. They are rather shy, restless, strictly arboreal birds, never descending to the ground, but frequenting forests, open wooded districts, groves, and gardens, and usually keeping among the higher branches; their flight is rolling and heavy, though tolerably swift. They subsist principally on fruit, but to some extent on insects, which they seek entirely among the trees. In addition to their harsh alarm cries, they have loud, clear, flute-like whistled notes, and these, together with their bright dress, make them objects of affectionate regard. Their nesting habits are quite uniform, all constructing a more or less elaborate basket-shaped nest which is suspended by the rim in the fork of a small branch, though in the Fig-birds (*Sphecotheres*) the nest is more slightly constructed and so thin that the eggs may be seen through the bottom; the latter are somewhat gregarious, it being common to find several nests in the same tree. The three to five eggs are mostly white or salmon-colored, spotted with brownish or pink.

Typical Orioles. — In its broadest acceptance this family includes but two genera, the first of which (*Oriolus*) embraces the typical Orioles to the number of forty or more, and the other the Fig-birds (*Sphecotheres*), the half a dozen species of which are confined to the Australian region. Of the Orioles, which are distinguished from the others by having the lores feathered, the best-known is the Golden Oriole (*O. galbula*), which is entirely of a rich golden yellow both above and below, with the exception of the lores, which are black, and the jet-black wings and tail, the former with the primaries broadly edged with yellow and the latter with all the feathers tipped with the same. They spend the winter months in South Africa, returning in as silent and unobtrusive a manner as possible to their summer homes in late spring. Each pair preëmpts a certain area of woodland in which they fiercely resent intrusions of others of their kind. They nest rather late, usually the last of May or early in June, constructing of strips of bark, grasses, etc., a neat, basket-shaped nest which is carefully fastened to a forked branch; the young are very tenderly cared for by the parents.

Differing from the last in having the black of the lores extending to a patch around and behind the eye is the Indian Oriole (*O. kundoo*) of Afghanistan, Turkestan, Kashmir, and the higher ranges of the Himalayas, while with the black of the lores widening to a band on the nape is the Black-naped Oriole (*O. indicus*) of Mongolia, China, etc. The Indian Oriole, Jerdon tells us, is an abundant species in well-wooded situations, where it frequents gardens, avenues, etc., feeding on various fruits, but especially the fig of the banian tree. Its note is a loud, plaintive cry, resembling *pee-ho*, while its nest is a slight cup-shaped affair of fine grasses and roots, and the eggs are white spotted with purplish. As an example of species in which yellow is not the principal color, we may select the Maroon Oriole (*O. traillii*) of the Himalayas, in which, with the exception of the head, throat, and wings, which are black, the entire plumage is a bright, shining maroon-red. Even more brilliant is the Crimson Oriole (*O. ardens*) of Formosa, in which the ground color both above and below is deep crimson.

The **Fig-birds** (*Sphecotheres*) differ from the Orioles in having the lores, as well as all the region around and beneath the eye, bare. Of the two Australian species, the Yellow-bellied Fig-bird (*S. flaviventris*) is a handsome bird, olive-green above with a shining black cap and rich jonquil-yellow under parts. Mr. Gould describes it as being very shy and difficult of approach, though Campbell says it was one of the most striking birds that visited the precincts of his camp in the Cardwell district, where "they often, especially in the morning, perched on the summits of the very trees to which our tents were suspended, and poured forth over our heads beautiful songs not altogether unlike those of the English Thrush." Their nests, like those of the other species, are open shallow affairs of wire-like stalks or tendrils of plants, usually placed in a horizontal fork at the extremity of a branch and high above the ground. The two or three eggs are usually some shade of green sparsely blotched with reddish or purplish brown.

THE BOWER-BIRDS

(Family *Ptilonorhynchidæ*)

There has been not a little discussion among ornithologists regarding the proper systematic position of these birds, some referring them to the neighborhood of the Thrushes or the Babblers; while others, as Professor Sundevall, have associated them with the Shrikes; but, all things considered, it is beyond question that their closest affinity is with the Birds-of-Paradise, with which, indeed, they have often been included. They are small birds, between eight and fourteen inches in length, with a bill not unlike that of a Thrush (*Turdus*) but stouter, and rather short, rounded, and concave wings. In brilliancy of plumage some of them approach the Birds-of-Paradise, though they are without the decorative plumes that are such a feature in the latter, while their marked peculiarity of bower building is imitated to a limited extent only by certain Paradise-birds such as *Ptilorhis*. The Bower-birds are confined to Australia and the Papuan Islands, and some half a dozen genera have been recognized. "Without exception," says Mr. Alfred J. North, "the bower building birds are the most extraordinary and interesting group of birds found in the world. It is true that many species form beautiful nests for the reception of their eggs and rearing their young, but in no instance is bird-architecture perfected so much as is seen in the wonderfully constructed playhouses or courting bowers of the family *Ptilonorhynchidæ*. The love of the beautiful is always displayed by these birds in the formation and manner of adornment of their playing places." These remarkable bowers, when first seen by Europeans, were supposed to be the playhouses of native children, but it has long been settled beyond question that they are made by birds, some of them smaller even than our Robin (*Planesticus migratorius*).

Satin Bower-bird. — Of the various species perhaps the oldest and best-known is the Satin Bower-bird (*Ptilonorhynchus violaceus*) of eastern Queensland, eastern New South Wales, and Victoria. The male, which is about twelve and a half inches long, is a lustrous purplish black above and below, the feathers with concealed grayish bases. The wings and tail are black, the feathers purple-edged; the bill is bluish horn-color, tipped with yellow, and the iris a beautiful light blue, the pupil being surrounded by a circle of red. The female is grayish green above and brownish and pale yellow below. These birds feed almost exclusively on berries and fruits, and in summer and autumn congregate in large flocks, doing much damage to the softer fruits, such as mulberries, peaches, apricots, bananas, oranges, and even lemons. Their notes are described as resembling the "noise made by small, rapidly running cog-wheels, accompanied by a deep hissing sound, this followed by some very sweet, clear notes, as those of other birds are imitated, for they are excellent mimics." Mr. North, in his "Nests and Eggs of the Birds of Australia and Tasmania," gives the following entertaining description of the bower of this bird: "The bower, or playhouse, is built on the ground, generally in scrub, and placed near a

fallen log or moss-covered rock. A space is cleared in the undergrowth from two to three feet in diameter, which is covered with a layer of thin sticks and twigs to a depth of three inches. In the center of this platform, which is slightly higher and slopes gradually to the sides, two parallel walls formed of thin, curved sticks and twigs are built, the base of the walls being thicker, and the inner portion of the bower resembling in form an inverted horseshoe. Great variation exists in the shape and size of these walls, which at base measure from ten inches to two feet in length, and are as a rule narrower at the top, twelve to fourteen inches in height, and externally ten to twelve inches in width at the entrance. Internally they measure at either end from four to six inches, which gradually widen out in the center of some from six to eight inches. Scattered over the platform are loose twigs, and about the entrance of the bower bits of bleached bone, land shells, pieces of moss, berries, and bright feathers, one or more of the latter, and chiefly the rigid wing- or tail-feathers of Pennant's and the Rose-bill Parakeets, being worked into the sides of the bower. Since the advent of settlers in Australia, any bright or glistening article is used by these birds to ornament their playgrounds. A bower which was tenanted by several birds the greater part of the year, and close to the house where I stayed during my visit, was, with the exception of a few land shells, entirely decorated by bits of broken crockery and glassware. Another was ornamented with a few bits of green moss, dead leaves, and dried sprays of flowers. At these bowers or avenue-like structures the sexes meet and disport themselves, chasing one another through their playground and stooping now and again to alter or add some new decoration. The male assumes at times some grotesque attitudes. With head lowered, feathers of the neck erect, and tail-feathers expanded, they move about the bower or pay attention to the females, more especially during the pairing season." The nest of this species — a rather bulky affair of long thin twigs and lined with eucalyptus leaves — is placed in the fork of a bush or tree from six to forty feet from the ground. The eggs, usually two in number, are very variable, but generally are rich cream-color, uniformly spotted, blotched, and dotted with brown.

Regent and Newton's Bower-birds. — It would be interesting, had we the space, to give accounts of all of these wonderful birds, but we can only make a passing reference to a few, among them the Regent Bower-bird (*Sericulus melinus*), which is the most beautifully plumaged bird known in Australia. About ten inches long, the male has the head, hind neck, and mantle bright orange-yellow, the back, rump, upper tail-coverts, upper wing-coverts, the two first primaries, and the lower parts black, and the inner quills and outer secondaries orange-yellow. The bill is yellow, the legs and feet black, and the iris straw-white. The female is slightly larger and is mainly brown above and dull whitish below. The bowers of this species are said to be smaller and more primitive than those of any other species, being only about ten inches by ten, and decorated with small land shells only. Quite in contrast with this is the huge structure made by Newton's Bower-bird (*Prionodura newtoniana*), a handsome species discovered in northeastern Queensland in 1882. The male is

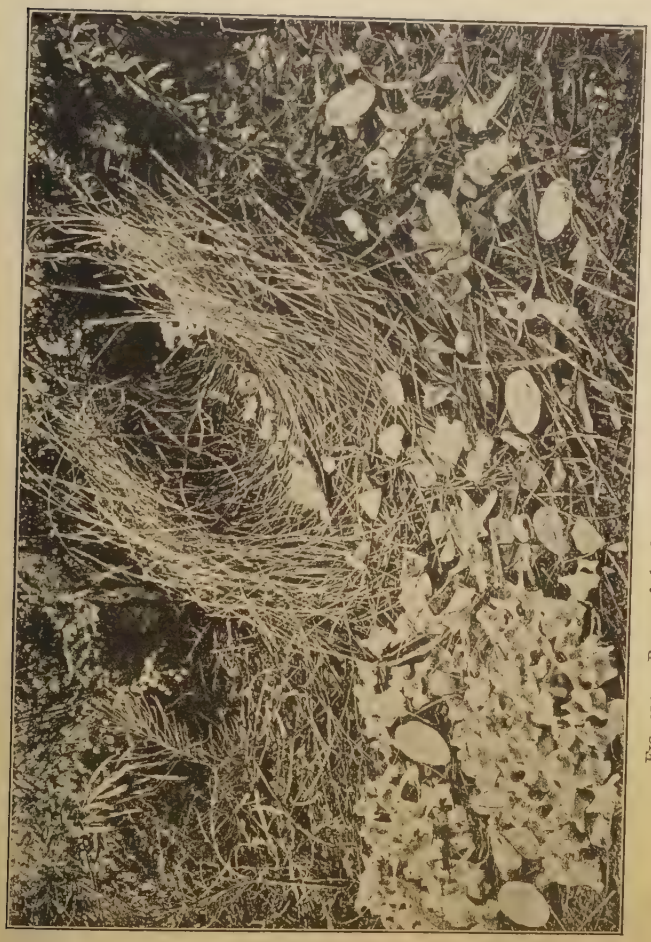


Fig. 212. — Bower of the Spotted Bower-bird, *Chlamydera maculata*.

mostly a golden olive above, "a broad crest on the crown of the head, the hind neck, and upper mantle rich golden yellow; upper wing-coverts like the back; primaries and secondaries brown, washed with golden olive; two central tail-feathers brown, the next on either side golden yellow with the apical half of the inner web and broad tip brown, the next golden yellow-brown at tip, the remainder golden yellow; throat and under surface bright golden yellow; bill dark brown, iris pale yellow." — North. The male is about nine and a half inches long, while the female is only about eight inches and is olive-brown above and ashy gray below, the iris brown.

Newton's Bower-bird is found mainly in or near the thick scrub, especially in the Bellenden Ker Range, and, although a resident where found, moves about from place to place as its food supply of fruits and berries changes. The following account of the remarkable bower of this species is quoted by North from the notes of a Mr. Day, who has had exceptional opportunity of seeing the bird in its native haunts: "I have found a great number of these bowers. Those of the first season are simply a lot of sticks and twigs placed around two small trees growing about a yard or slightly more apart. The following season it is added to, and gradually assumes a V-shape at the bottom of the inner portion, being now about two feet in height. As a rule, there is a stick placed transversely across the bower, within five or six inches of the bottom. The walls are added to each season, but one is always built higher than the other after the first year. The largest I have ever found was nine feet high on one side and six feet six inches on the other, and resembles two pyramids of different heights with their bases touching each other. Some bowers are rounded at the bottom, and nearly all I have ever seen are more or less ornamented with floral decorations according to the season of the year. These consist of pieces of green moss, bits of fern, white rock lily, orchids, and flowers of other plants, and are placed inside on the high wall and at the bottom of the bowers. Seldom have I found a bower with the lower wall decorated. The flowers are quite fresh, the birds picking out the dead ones every day and replacing them with freshly gathered ones. Sprigs of pure white orchids and wax-like rock lilies are the flowers most favored for decorating purposes. Although these bowers are used by both sexes as a playground where they can chase and gambol with one another, they are frequently the scene of a pitched battle between a couple of adult males. This is caused by one male removing the flower placed in position by another, and a fight ensues, the remainder of the birds looking on and making a great noise, but not interfering with the combatants. I have never seen the females or young males fight; it is always the finest-plumaged old males. These birds are very tame, and I have sat for several hours at a time watching their curious antics at the bowers. Flowers are all placed upright, inside their playhouses, but to see what the birds would do I once turned one of their orchids upside down. On the birds reassembling they made a great fuss and noise; and one of the old males replaced the flower in its proper position. I repeated the operation, and the flower was again placed upright by the old male. The large bowers are resorted to by a number of birds, and I have obtained over

thirty at various times at a well frequented playhouse. On Mount Bartle Frere I found fifteen of their bowers of different sizes within a radius of one hundred yards. I have also seen them fully a mile apart." The nest and eggs of this species are not known.

The **Tooth-billed Bower-bird** (*Scenopœetes dentirostris*), so called from the presence of two notches in the edge of the upper mandible, is mainly olive-brown above and fulvous below, the feathers of the lower parts with broad dusky brown margins; the sexes are alike. These birds do not build the elaborate playhouses described for the other species, but clear away the sticks and leaves from a level space from three to five feet in diameter, over which they strew freshly gathered leaves from a particular kind of tree. These leaves, from forty or fifty to a hundred or more in number, are from six to ten inches long and about two inches wide, and as fast as they become dry are thrown to one side, often forming heaps a foot or more high about the "circus-rings," as these playgrounds are called. Here the birds assemble and may be seen playing about or turning them over. This species affords a sort of transition, at least as regards habits, to the so-called Catbirds (*Ælurædus*), since none of these construct either bowers or playgrounds. They are birds about the size of the true Bower-birds and have the plumage more or less spotted. The most remarkable of the Bower-birds is a New Guinea species which builds a real "house," or hut. Its remarkable structure is described and figured in "The Ibis."

BIRDS-OF-PARADISE

(Family *Paradiseidæ*)

Beyond question the most gorgeously plumaged members of the entire class are the splendid Birds-of-Paradise, and it is small wonder that the Europeans who first beheld them should have called them "God's birds" and "Birds of the Sun," and should have imagined them ethereal enough to feed only upon dew, and it was an easy step to denominate them Birds-of-Paradise. The only birds that can really compare with them, at least in brilliancy of coloration, are the Hummingbirds and Long-tailed Trogons; but when we consider the curious not to say fantastic forms assumed by the plumage, they far surpass these, as indeed they do all other birds. The plumes of these birds had doubtless been used for ornamentation by savage people for a very long time, but apparently the first to bring the Birds-of-Paradise to European attention were certain of the adventurers who accompanied Magellan on his famous voyage around the world. When, in December, 1521, they reached the island of Tidore, in the Moluccas, they were given two beautiful bird skins by the native ruler, who desired them to be taken to the King of Spain. As these skins, and in fact all the early ones derived from native sources, were without wings or feet, they gave rise to many fabulous tales, such as the notion that the birds spent their whole lives floating in the air, turning always toward the sun, except perhaps rarely,

when they attached themselves among the highest branches of the loftiest trees, supported by the long tail plumes. The absence of the feet was accounted for in another way by one chronicler, who states that the birds were accustomed to getting drunk on nutmegs, and falling helpless to the ground had their legs eaten off by ants. They were supposed to feed upon dew or vapor, or occasionally upon the nectar of flowers, and the female was said to lay her single egg upon the back of her consort.

> "None knowes their nest, none knowes the dam that breeds them.
> Foodless they live; for th' Aire alonely feeds them:
> Wingless they fly; and yet their flight extends,
> Till with their flight, their unknown live's-date ends."

These absurd notions remained current for more than two centuries, though it was perhaps in fanciful mood that the great Linnæus was prompted to name the Great Bird-of-Paradise *Apoda*, or footless. But gradually from this maze of myth and superstition has come a rational understanding of these incomparable birds, though as a matter of fact we are still in ignorance of the complete history of perhaps a majority of the forms. While there have been — and indeed still are — grave differences of opinion as to their proper systematic position, it seems to be now pretty generally accepted that with the exception of the Bower-birds (*Ptilonorhynchidæ*), which were formerly, and by some authorities are still, united with them, they find their closest of kin among the Crows (*Corvidæ*), which they resemble not only in the structure of the bill and feet, but in habits and voice as well. The process of nature by which they acquired such varied and beautiful plumage is of course quite unknown, though it is difficult to see how it could have resulted purely as a result of natural selection.

Rifle-birds. — The *Paradiseidæ* as at present accepted comprise about sixty-five species disposed among some thirty genera, and are almost wholly confined to New Guinea and the near-by Papuan Islands, with a limited number extending into Australia, mainly in the northeastern portion. The family is capable of division into two fairly well marked subfamilies, in the first of which (*Falcinellinæ*), known as the Long-billed or Slender-billed Birds-of-Paradise, the bill is elongated and slender with the culmen exceeding the tarsus in length. Of the four genera and thirteen or fourteen species in this subfamily we may begin with *Ptilorhis*, comprising the so-called Rifle-birds of Australia and New Guinea, which take their name, it is said, from the resemblance of their coloration to the uniform of the rifle regiments of the British army. Although not by any means so gorgeously appareled as many of their relatives, they are nevertheless very beautiful birds, especially the typical Rifle-bird (*P. paradisea*), the male of which is velvety black above, changing to deep fiery purple when viewed away from the light. The wings are black with the coverts deep purple, and the secondaries shaded with violet and purplish blue, while the tail is velvety black, the two central feathers burnished steel-green; the top of the head is burnished coppery green, becoming metallic steel-blue on

the hind neck, and the sides of the face, neck, and throat are black, shaded with purple, while from the lower throat there extends a large triangular patch of burnished steel-green; the breast is velvety purple, the plumes of the lower breast being edged with metallic olive green, which is the prevailing color of the remainder of the lower parts. The adult female is ashy brown above, and mainly ochraceous buff mottled and barred with black below. The length of this species is between eleven and twelve inches. These splendid birds make their homes in the dense subtropical scrubs of southeastern Australia, especially among the cedar bushes which skirt the mountains and creeks, where, during the breeding season, they are easily found. The male is a rather noisy bird, frequently uttering its call, which resembles the word *gass*, which is the vernacular name by which it is known among the natives of the Richmond River district. As the sun's rays gild the tops of the trees each morning, the male Rifle-bird ascends to the higher branches of the pines and spends the morning hours in sunning and preening his plumage, and in short flights from tree to tree, during which passages he makes an extraordinary noise resembling the shaking of a piece of new silk. The nest of this species, usually placed in an entanglement of thick vines at some distance from the ground, is a rather bulky structure made chiefly of green stems and fronds of ferns, and is ornamented about the edge with snake skins and lined with rootlets and small twigs. The eggs, two in number, are oval, fine grained, and glossy, and in color are a pinkish buff marked and streaked longitudinally with reddish or purplish brown.

Victoria Rifle-bird. — The smallest member of the genus is the Victoria Rifle-bird (*P. victoriæ*), which attains a length of only nine or ten inches, and inhabits a limited strip of country some two hundred and fifty miles long in the rich tropical scrubs of northern Queensland. It is similar to the species last described, being distinguished by its small size and by the purple of its breast presenting the appearance of a broad pectoral band, bounded above by the scale-like feathers of the throat and below by the abdominal band of deep oil-green, and by the broad and much more lengthened flank feathers which show very conspicuously. This species, and perhaps the others as well, exhibits at least to a limited extent the peculiarity of having a "playground" which recalls that of the Bower-birds, though it is not so elaborate. A Mr. Broadbent, quoted by Campbell in his "Nests and Eggs of Australian Birds," says: "The bird simply selects the broken limbs of a dead gum on the border of the scrub, a broken palm, or perhaps a dead stump; but having chosen this, here he returns at dawn day after day, and disports himself, now spreading his wings and rubbing them against the surface of the playground, and then whirling round with wings expanded. This he sometimes keeps up as long as half an hour."

The nest of the Victoria Rifle-bird is an open, shallow, rather loosely constructed affair of tough branching rootlets and a few broad, dead leaves and tendrils, and is lined inside with a layer of broad leaves and fine twigs; occasionally, as in the last species, a snake skin is woven about the edge of the nest. The two glossy eggs are flesh-tinted in color, streaked longitudinally with rich reddish and purplish brown.

Albert Rifle-bird. — The only other Australian species of the genus, known as the Albert Rifle-bird (*P. alberti*), is confined to the Cape York Peninsula in Queensland. Slightly larger than the two species just described, it, in company with the remaining members of the genus, differs in having the metallic shield extending from the chin to the upper breast, and followed by a double band of purple and oily golden green, while the long, silky flank plumes reach far beyond the tail. This species, according to Gould and others, is an extremely shy bird, frequenting only the densest "brushes," into the mazes of which it plunges on the slightest suspicious movement. It feeds mainly upon insects, but is known also to make use of berries, seeds, etc., and has been noted climbing about the trunks and limbs of trees in search of its food. "Its cry," says Macgillivray, "is very striking; upon being imitated by man, which may easily be done, the male bird will answer; it consists of a loud whistle resembling *wheeoo* repeated three times, and ending abruptly in a note like *who-o-o*. Both sexes utter the same note, but that of the male is much the loudest." The pose assumed by the males when displaying for the benefit of the females is described by Mr. Harry Barnard as follows: "It generally selects a large horizontal vine, stretched between two trees, throws its wings forward till the ends meet, and rubbing them together makes a loud rustling noise, which can be heard some distance away; at the same time the bird throws its head from side to side, or first over one shoulder and then over the other. At other times he would get on an upright vine or stick, spread its wings and tail, and then throw itself first round on one side of its support and then on the other, the head being thrown well back." The nest and eggs are similar to those of the other Rifle-birds.

Fig. 213. — Magnificent Rifle-bird, *Ptilorhis magnifica*.

Magnificent Rifle-bird. — Most closely related to the last is the Magnificent Rifle-bird (*P. magnifica*) of New Guinea, the male of which has the entire upper parts a deep, velvety black, with rich dark purple reflections, the secondaries being black with green reflections, while the top of the head, center of the throat, and upper breast are shining bluish green, becoming purple in certain lights; the flanks, abdomen, and side plumes are purple, the

two central tail feathers shining green, and the remainder of the tail velvety black; the female is cinnamon rufous above, and whitish, thickly barred and covered with dusky blackish below. The two remaining species of *Ptilorhis* are confined to New Guinea.

Twelve-wired Bird-of-Paradise. — Perhaps most closely related to the last is the remarkable Twelve wired Bird of Paradise (*Seleucides ignotus*), which is the sole representative of its genus, and takes its name from the wire like elongation of the shafts of certain of the flank plumes. It is found throughout New Guinea and the adjacent island of Silawati, and is described as follows by Mr. Alfred Russel Wallace, one of the few naturalists who has been privileged to see it in its home: "This bird is about twelve inches long, of which the compressed and curved beak occupies two inches. The color of the breast and upper surface appears at first sight nearly black, but a close examination shows that no part of it is devoid of color; and by holding it in various lights, the most rich and glowing tints become visible. The head, covered with short, velvety feathers, which advance on the chin much farther than on the upper part of the beak, is of a purplish bronze color; the whole of the back and shoulders is rich bronzy green, while the closed wings and tail are of the most brilliant violet-purple, all of the plumage having a delicate, silky gloss. The mass of feathers which cover the breast is really almost black, with faint glosses of green and purple, but their outer edges are margined with glittering bands of emerald-green. The whole lower part of the body is rich buffy yellow, including the tufts of plumes which spring from the sides and extend an inch and a half beyond the tail. About six of the innermost of these plumes on each side have the midrib elongated into slender black wires, which bend at right angles, forming one of those extraordinary and fantastic ornaments with which this group of birds abounds. The bill is jet-black and the feet bright yellow." According to the same authority, it "frequents flowering trees, especially sago-palms and pandani, sucking the flowers, round and beneath which its unusually large and powerful feet enable it to cling. Its motions are very rapid. It seldom rests more than a few moments on one tree, after which it flies off and with great swiftness to another. It has a loud, shrill cry, to be heard a long way off, consisting of *cah, cah*, repeated five or six times in a descending scale, and at the last note it generally flies away. The males are quite solitary in their habits, though, perhaps, they assemble at certain times like the true Paradise-birds."

D'Albertis's Bird-of-Paradise. — The third genus of this subfamily is *Drepanornis*, the two species of which are well distinguished from all the others by possessing a long, slender, sickle-shaped bill, a moderately long, graduated tail, and the flank plumes produced into a brown, fan-like shield. They are confined to New Guinea, perhaps the best-known being D'Albertis's Bird-of-Paradise (*D. albertisii*), which attains a length of about thirteen and a half inches, of which the much-curved bill takes up nearly three inches. Signor D'Albertis, the discoverer of this bird, describes it as follows: "Above the beak are two tufts or horns, formed of small feathers deeply marked with green and copper-

colored reflections. The long feathers which grow from the sides of the breast are, when closed, gray, shot with a violet tint; but when spread they form a semicircle around the body, and in certain lights shine like gold, in others like fire. Long feathers of a grayish violet color grow from the sides, the edges being of a metallic violet luster. The upper parts of the wing- and tail-feathers are of a darkish yellow, as are those of the back. The feathers of the throat are black, shading off into olive-color; those of the breast a grayish purple, with an olive band; the abdomen is white. When the bird raises the long feathers on his sides and breast, they form two semicircles, and he presents as extraordinary and beautiful a sight as one could behold."

Long-tailed Bird-of-Paradise. — The great Epimaque, or Long-tailed Bird-of-Paradise (*Falcinellus striatus*), which may be taken as typical of the final genus of the slender-billed group, is distinguished at once by the enormously elongated tail, which much exceeds the length of the body. In coloration it much resembles the Twelve-wired Bird-of-Paradise, being dark velvety, glossed with bronze and purple, while the magnificent tail is glossed on the upper surface with the most intense opalescent blue. But its chief ornament consists of a group of broad plumes which spring from the sides of the breast and which are dilated at the extremity and banded with the most vivid metallic blue and green. This splendid bird inhabits the Arfak Mountains of New Guinea, and is one of the wonderful creatures known only or mainly by the imperfect skins prepared by the natives. The three other species of the genus are found in various parts of New Guinea.

Typical Birds-of-Paradise. — Although not recognized by Rothschild, who has recently monographed the group, the second subfamily may be known by having the bill short and more or less stout, with the culmen shorter than the tarsus; it comprises the bulk of the Birds-of-Paradise. Agreeing with the species last mentioned in possessing a very long, graduated tail, which is much longer than the body, is the **Gorget Bird-of-Paradise** (*Astrapia nigra*), this being the best known of the three species comprising the genus *Astrapia*. This species is especially distinguished by having the lores and angle of the mouth thickly feathered, while the head is surrounded by an erect frill of a metallic golden coppery gloss, and the lower parts a rich velvety grass-green, while the wings and tail are black, more or less glossed with purple. Agreeing with the last in having a long, graduated tail, although in this case it is shorter than the body, is the **Wattled Bird-of-Paradise** (*Paradigalla carunculata*) of the Arfak Mountains of New Guinea, which is distinguished by the presence of an erect orange wattle on the lores and a pendent one of azure-blue at the angle of the mouth, the head and throat being without frills or other peculiar ornamentation; it is the only species of its genus, perhaps its nearest of kin being the monotypic *Macgregoria pulchra*, in which the eye is ornamented. This brings us to the confines of the typical and largest genus, *Paradisea*, which embraces ten species and a number of fairly well marked subspecies, and is distinguished among other features by having the flank plumes produced to an extraordinary length and forming two enormous bunches of feathers reaching far beyond the tail, while the two central

tail-feathers are thread like or horny in structure. Of the several species the **Great Bird-of-Paradise** (*P. apoda*) is not only one of the most gorgeously beautiful, but was the first member of the family to be described, taking its specific designation, as already pointed out, from the circumstance of the original specimens being prepared without feet. About eighteen inches in total length, the male (the females of all these birds are very plain and ordinary in appearance) has the body, wings, and tail of a rich coffee-brown, which deepens on the breast to a blackish violet or purple-brown. The whole top of the head and neck is of an exceedingly delicate straw yellow, the feathers being short and close set so as to resemble plush or velvet; the lower part of the throat up to the eye is clothed with scaly feathers of an emerald green color, with a rich metallic gloss, and velvety plumes of a still deeper green extend in a band across the forehead and chin as far as the eye, which is bright yellow. The two middle feathers of the tail have no webs except a very small one at the base and at the extreme tip, forming wire-like cirrhi, which spread out in an elegant double curve and vary from twenty-four to thirty-four inches long. From each side of the body, beneath the wings, springs a dense tuft of long and delicate plumes, sometimes two feet in length, of the most intense golden orange color and very glossy, but changing toward the tips into a pale brown. This tuft of plumage can be elevated and spread out at pleasure, so as to almost conceal the body of the bird. The female is a nearly uniform coffee-brown color, which never changes, while the young males of the first year resemble the females, and it appears that they do not attain full plumage until the fourth year.

The Great Bird-of-Paradise is confined to the Aru Islands, where, according to Mr. Wallace, it was very abundant and often met with in small parties, though now it seems threatened with extermination. It is very active and vigorous, and has a loud, shrill cry likened to the syllables *wawk-wawk-wawk wok, wok, wok*, which may be heard at a great distance. It is strictly arboreal in its habits, and in common with the other members of its genus is omnivorous, feeding on fruits, especially small figs, and insects such as grasshoppers, locusts, cockroaches, etc. The nesting habits appear to be entirely unknown, though Mr. Wallace has described entertainingly the so-called dancing parties of the males, which are only engaged in during or just preceding the breeding season. The birds select an immense spreading tree in the forest, particularly one with a large head and large but scattered leaves, giving a clear space for them to play and exhibit their beautiful plumes. "On one of these trees a dozen or twenty full-plumaged male birds assemble together, raise up their wings, stretch out their necks, and elevate their exquisite plumes, keeping them in continual vibration. Betweenwhiles they fly across from branch to branch in great excitement, so that the whole tree is filled with waving plumes in every variety of attitude and motion." The natives take advantage of this habit in procuring specimens. When they find a tree that has been selected by the birds for this purpose, they build a little shelter of palm leaves in a convenient place among the branches, to which the hunter repairs before daylight, armed with his bow and a number of blunt-pointed arrows. When the birds come at sunrise and begin their dancing, the hunter

shoots with his blunt arrow so strongly as to stun the bird, which drops down and is secured and killed by a boy in waiting at the base of the tree. In this manner a number may be procured before the others take the alarm and make off. The **Lesser Bird-of-Paradise** (*P. minor*), of which three subspecific forms are now recognized, is similar to the last but much smaller; it occurs in New Guinea and adjacent islands.

Red Bird-of-Paradise. — Very different, however, is the marvelous Red Bird-of-Paradise (*P. rubra*) of Waigiu, Batanta, and Gemien. About the same size as *Paradisea minor*, it has the side plumes of a rich crimson instead of yellow and only extending about three or four inches beyond the end of the tail, but they are somewhat rigid, with the ends curved downward and inward and tipped with white. "The two middle tail-feathers, instead of being simply elongate and deprived of their webs, are transformed into stiff black ribands, a quarter of an inch wide, but curved like a split quill, and resembling thin, half-cylinders of horn or whalebone. When the dead bird is laid on its back, it is seen that these ribands take a curve or set, which brings them round so as to meet in a double circle on the back of the bird; but when they hang downward during life they assume a spiral twist and form an exceedingly graceful double curve. They are about twenty-two inches long and always attract attention as the most conspicuous and extraordinary feature of the species. The rich metallic green color of the throat extends over the front half of the head to behind the eyes and on the forehead forms a double crest of scaly feathers; the bill is gamboge-yellow."

King Bird-of-Paradise. — Interesting as are the other members of the genus, we must pass them by and with brief mention of the beautiful little King Bird-of-Paradise (*Cicinnurus regius*) proceed to the final members of the group. This little feathered gem, "the supposed King of the Greater Birds-of-Paradise," is the sole representative of its genus, though sometimes divided into two slightly differing geographic races, being native throughout New Guinea and a number of the neighboring islands. But six and a half inches in length, it has the head, throat, and entire upper parts of a brilliant metallic crimson, shading into orange-crimson on the forehead, while the breast and abdomen are pure silky white, between which color and the crimson of the throat there is a broad band of rich metallic green. "From each side of the body beneath the wing springs a tuft of broad delicate feathers about an inch and a half long, of an ashy color but tipped with a broad band of emerald-green, bordered within by a narrow line of buff. These plumes are concealed beneath the wing, but when the bird pleases, can be raised and spread out so as to form an elegant semicircular fan on each shoulder. But another ornament still more extraordinary and, if possible, more beautiful, adorns this little bird. The two middle tail-feathers are modified into very slender, wire-like shafts, nearly six inches long, each of which bears at the extremity, on the inner side only, a web of emerald-green color, which is coiled up into a perfect spiral disk. The bill is orange-yellow and the feet and legs of a fine cobalt-blue." The extraordinary display of this species has recently been described by Sir William Ingram from an example in his aviary in England, whither it had been brought from the Aru Islands: "He always

LESSER BIRD OF PARADISE
(*Paradisea minor*)

commences his display by giving forth several short, separate notes and squeaks, sometimes resembling the call of a Quail, sometimes the whine of a pet dog. Next he spreads out his wings, occasionally quite hiding his head; at times stretching upright, he flaps them, as if he intended to take flight, and then with a sudden movement gives himself a half turn so that he faces the spectators, puffing out his silky white lower feathers. Now he bursts into his beautiful melodious warbling song, so enchanting to hear but so difficult to describe. He sings with a low bubbling note, displaying all the while his beautiful fan-like

FIG. 214. — Six-plumed Bird-of-Paradise, *Parotia sefilata*.
King Bird-of-Paradise, *Cicinnurus regius*.

side plumes, which he opens and closes, in time with the variations of his song. These fan plumes can only be expanded when his wings are closed, and during this part of the display he closes his wings and spreads out his short tail, pressing it close over his back so as to throw the long tail wires over his head, while he gently swings his body from side to side. The spiral tips of the wires look like small balls of burnished green metal, and the swaying movement gives them the effect of being tossed from one side to the other. The swaying of the body seems to keep time with the song. Then comes the finale, which lasts only for a few seconds. He suddenly turns round and shows his back, while the white fluffy feathers under the tail bristle in his excitement; he bends down on the perch in the attitude of a fighting cock, his widely open bill showing distinctly

the extraordinary light apple-green color of the gullet, and sings the same gurgling notes without once closing his bill, and with a slow dying-away movement of his tail and body. A single drawn-out note is then uttered, the tail and wires are lowered, and the dance and song are over."

Magnificent Bird-of-Paradise. — In some respects quite close to the last, but differing in the possession of a shield of feathers on the back and the absence of flank plumes, is the genus *Diphyllodes*, the two species of which are found in New Guinea. The best-known of the species is the remarkable little Magnificent Bird-of-Paradise (*D. magnificus*), which is under seven inches in length, having the head covered with close-set velvety brown feathers, which advance on the beak so as to cover the nostrils. "From the nape springs a dense mass of feathers of a straw-yellow color and about one and a half inches long, forming a mantle over the upper part of the back. Beneath this, and forming a band about one third of an inch beyond it, is a second mantle of rich, glossy, reddish brown feathers. The rest of the back is orange-brown, the tail-coverts and tail dark bronzy, the wings light orange-buff. The whole under surface is covered with an abundance of plumage springing from the margins of the breast, and of a deep rich green color, with changeable hues of purple. Down the middle of the breast is a broad band of scaly plumes of the same color, while the chin and throat are of a rich metallic bronze. From the middle of the tail spring two narrow feathers of a rich steel-blue and about ten inches long. These are webbed on the inner side only and curve outward, so as to form a double circle." Very little is known concerning this rare species.

Wilson's Bird-of-Paradise. — Also allied to the King Bird-of-Paradise, but having the head bare, with the exception of a few narrow tracts of feathers, is Wilson's Bird-of-Paradise (*Schlegelia wilsoni*), which is confined to the islands of Waigiu and Batanta. In life the head is of the brightest imaginable blue, the bizarre effect being till further heightened by "two fine lines of feathers, which running lengthwise and from side to side form a dark cross upon the brilliant azure background." The mantle is bright yellow and the remainder of the back bright metallic crimson, while the lower throat and breast form a shield of metallic grass-green. The two central tail-feathers are narrow, prolonged for five or six inches beyond the others, and after crossing each other are curved into a nearly complete circle of bright, steely purple.

Six-plumed Bird-of-Paradise. — Varied and wonderful as are the plumes and ornaments already described, they by no means exhaust the possibilities within the limits of this incomparable group, for in the Six-plumed Birds-of-Paradise (*Parotia*) we have quite a new departure. Of the five species now recognized the first and best-known is *P. sefilata* of the Arfak Mountains of New Guinea. About twelve and a half inches in length, the general color above is a rich purplish velvety black, glowing with bronze and deep purple in certain lights, while the throat and breast are scaled with broad, flat feathers of an intense golden coppery hue which changes to green and blue tints in some lights. The frontal plumes are purplish, the feathers tipped with shining, satiny white, forming a band across the forehead, these stiff plumes being capable of erection or de-

pression at will, while above the ear-coverts are tufts of elongated, silky, hair-like plumes, from among which spring the six wonderful feathers from which the bird receives its name. These are slender wires six inches long, each ornamented with an ovate racket of velvety black at the extremity. There is also an immense tuft of soft feathers on each side of the breast. This splendid bird was for many years only known from the flat, badly prepared skins obtained from the natives, but recently Signor D'Albertis has observed it in a living state, and from him we quote the following account: "After standing still for some moments in the middle of the little glade, the beautiful bird peered about to see if all was safe, and then he began to move the long feathers of his head, and to raise and lower a small tuft of white feathers above his beak, which shone in the rays of the sun like burnished silver; he also raised and lowered the crest of stiff feathers, almost like scales, and glittering like bits of bright metal, with which his neck was adorned. He spread and contracted the long feathers on his sides in a way that made him appear now larger and again smaller than his real size, and, jumping first on one side and then on the other, he placed himself proudly in an attitude of combat, as though he imagined himself fighting with some invisible foe."

Standard Wing. — Differing from the last in the absence of the wire like head plumes is the equally remarkable Standard Wing (*Semioptera wallacii*) of the islands of Gilolo and Batchian, which is distinguished at once by the presence of two long, narrow, white feathers which spring from among the short plumes at the bend of the wing and are capable of being erected at pleasure. The length of these feathers is from six to six and a half inches, the upper one slightly exceeding the lower, while the total length of the bird is slightly over eleven inches. Mr. Alfred Russel Wallace, who discovered this peculiar bird on the island of Batchian, describes it as follows: "The general color is a delicate olive-brown, deepening to a kind of bronzy olive in the middle of the back, and changing to a delicate ashy violet with a metallic gloss on the crown of the head. The feathers which cover the nostrils and extend halfway down the beak are loose and curved upward. Beneath, it is much more beautiful. The scale-like feathers of the breast are margined with rich, metallic blue-green, which color entirely covers the throat and sides of the neck, as well as the long, pointed plumes which spring from the sides of the breast and extend nearly as far as the end of the wings. The bill is horny olive and the feet bright orange. This bird frequents the lower trees of the forest, and, like most Paradise-birds, is in constant motion, — flying from branch to branch, clinging to the twigs and even to the smooth and vertical trunks as easily as a Woodpecker. The males at short intervals open and flutter their wings, erect the long shoulder feathers, and spread out the elegant green breast shields."

Superb Bird-of-Paradise. — With a brief description of the Superb Bird-of-Paradise (*Lophorina superba*) we must close our account of the typical members of this family. In this little bird — it is but nine inches in length — the "acme of strange plumal adornment seems to be attained," since in addition to a beautiful pectoral shield of bright, metallic green plumes there springs from the nape

of the neck an immense erectile forked shield of velvety black plumes glossed with bronze, which exceeds the wings in length. When in repose this neck shield lies flatly upon the back, but when erected, it, in conjunction with the breast plumes, most completely changes the form and appearance of the bird.

Manucodes. — Of somewhat doubtful position, but probably correctly placed here, are the so-called Manucodes, a name, by the way, which was applied to Birds-of-Paradise in general for more than two hundred years, but which has of late been restricted to a number of handsome birds of the Papuan subregion. They lack the several forms of ornamental plumes that are such a prominent feature in most of the other members of the family, though in certain of them the feathers of the head, neck, and breast are curiously crinkled, producing an elegant effect. They are chiefly remarkable for the extraordinary convolution of the trachea, at least in the males, these convolutions lying on the breast and between the skin and muscles, a peculiarity which gives them a very loud, clear, ringing voice, and is quite unique among passerine birds. The principal genus is *Manucodia*, in which the plumage is mainly a glossy, metallic steel-green, inclining to purple in certain lights. Perhaps the best-known species is Comrie's Manucode (*M. comrii*) of the islands of the D'Entrecasteaux group, which is about seventeen inches long and is the finest and largest of the genus.

THE CROWS AND JAYS

(Family *Corvidæ*)

If we could consider only the typical members of this family, — namely, the Crows, Ravens, Daws, Rooks, Jays, Nutcrackers, Magpies, etc., — it would form a relatively compact and rather easily diagnosed group, but ornithologists are by no means agreed as to the limits of the *Corvidæ*, with the result that it is usually made to include a number of forms showing a greater or less degree of relationship with other families, and until the exact status of these outlying forms can be definitely settled, this family, like so many other passerine groups, must remain without sharp, circumscribing lines. Broadly speaking, however, the *Corvidæ* are rather large to very large birds — the Ravens being the largest of the passerine series — with a generally stout, compressed conical bill which is never distinctly notched nor angulated at the base, and usually roundish, non-operculate nostrils, which are usually hidden by frontal tufts. The wings are variable in shape, in some being long and pointed, in others short and rounded, but all possessing ten primaries, of which the outer is short and only about half the length of the next. The tail is also variable, being usually more or less rounded or graduated, but never emarginate nor forked. The legs and feet are very strong, for most of these birds walk well on the ground, and the middle toe with its basal segment is united for about half its length to both lateral toes. The nearest relatives of the *Corvidæ* appear to be the Shrikes (*Laniidæ*), which differ in possessing hooked bills, and the beautiful Paradise-birds (*Paradiseidæ*),

which, aside from the curiously modified plumage, differ chiefly in the abnormal character of the feet. A number of the Jays resemble certain of the Titmice (*Paridæ*), with which they are doubtless quite closely related. Some systematists place the group at the head of the avian line, but, all things considered, it seems likely that this position should be awarded the Finches and their kin. The *Corvidæ* are active, energetic birds, possessing a high degree of intelligence, and, as will be recounted later, some of them are able to articulate with distinctness words and short sentences. Ordinarily they are shy, suspicious, and difficult of approach, though there are some notable exceptions, such as the Canada Jay, which comes fearlessly and inquisitively about camps, and the Hooded Crow of India in which centuries of protection has inculcated unusual confidence in the human race. They frequent mostly wooded, often heavily timbered regions, and are strictly omnivorous feeders, taking insects, small reptiles, eggs, and nestlings as well as grain, seeds, fruits, and berries, and by choice or force of circumstances a number will feed on carrion.

The *Corvidæ* is a large group, comprising upward of two hundred species, and while it is most strongly developed in the Northern Hemisphere, it is so nearly cosmopolitan that only New Zealand and a restricted portion of Polynesia are without representatives. North America possesses a fair number of forms, while South America is but poorly supplied, being entirely without representatives of the Crows and Ravens (*Corvinæ*), though possessing a few Jays (*Garrulinæ*), which range as far south as approximately the limits of the temperate districts. The family is by some divided into three subfamilies, though the limits are not always sharply definable, nor is the grade of each entirely without question. Beginning with the typical subfamily (*Corvinæ*), in which the wings are long and pointed and exceeding the tail in length, we may first consider the great genus *Corvus*, which, as here accepted, is almost world-wide in distribution. The common **American Crow** (*C. brachyrhynchos*), which in several slight geographic races spreads throughout practically the whole of the North American continent, though somewhat locally in the west, is the best known of the New World species, being altogether too familiar to need extensive description. Ordinarily the Crow is exceedingly shy and difficult of approach, having apparently recognized long ago that the hand of man is against him, though in places such as large city parks where not molested he often permits one to come much closer than in the open country. When feeding in company, which he usually does, there are generally several individuals in commanding positions which give warning of the approach of danger, when with loud *cawing* all fly to a place of safety. During the summer when they are rearing their young they are scattered usually in pairs over this vast territory, but soon small, evidently family parties are seen, and in the fall they congregate, often in countless thousands, and resort to some chosen woodland for roosting purposes. Thus of a famous Crows' roost near Baxter, Iowa, Mr. Preston writes as follows: "During the winter of 1891–1892 the number was estimated at forty thousand birds. About sunset they came in small flocks and straggling companies from long distances away, gathering in large fields or meadows, so thick as to look like plowed land.

In the dusk of evening the trees on a whole hillside appeared like a dark bank, so vast was the rookery. We visited the resort often after dark to hear the varied sounds that ever arose from the restless, scolding birds, whose voices could easily be heard a mile distant. A whistle or shout was cause for alarm, and the entire flock would rise up like a dark cloud, and the beating of wings sounded like a strong wind. Sometimes they would fly a mile off, and, returning, circle about and begin settling much as Chimney Swallows do, striking each other and the branches with their wings; the din of quarreling for places, changing, and flying up and down was terrible; some cawed loudly, others muffled their tones; some imitated the cry of a child, and some the squawk of a chicken; but the combined effect was a vast, weird wail that reverberated through the forest and died away on the night winds."

Such a rookery existed in the woods near Arlington, Virginia, opposite the city of Washington, D.C., the members of which ranged during the day over the states of Maryland and Virginia in a radius of perhaps twenty or thirty miles, returning in straggling flocks in late afternoon. A strange fatality has overtaken this colony on several occasions, this being an epidemic of roup, and during some excessively cold weather the cornea of the birds' eyes was frozen, rendering them blind and practically helpless, and they starved to death by thousands. The Crow, like most of his kind, is strictly omnivorous. During the winter they feed largely on Indian corn left in the fields, berries, seeds, and nuts then obtainable, as well as offal and the flotsam and jetsam cast up along the shores of the salt water. In spring they do much damage by pulling up sprouting corn, but they also feed on insects of all kinds, grubs, snails, small reptiles, and mammals, and are very destructive to the eggs and young of small birds. Altogether it is questionable if the damage they accomplish is offset by their good deeds in destroying insects and other pests. They prefer rather open woodland and river bottoms for nesting sites, placing the large, open, deeply cup-shaped nest in trees at varying heights from the ground. The handsome eggs, generally four or five in number, are usually a malachite or olive green with irregularly shaped blotches and spots of different shades of brown and gray; a single brood is reared in a season.

Fish Crow. — Sometimes found associating with the Common Crow, especially in winter, is the Fish Crow (*C. ossifragus*), which is distinguished at once by its smaller size, being smaller than the smallest race of the former, more glossy plumage, and above all by its very different notes, having a hoarse, guttural *cah, cah*, instead of the clear *caw* of the *brachyrhynchos*. It is distributed principally along the Gulf and Atlantic coasts as far north as Massachusetts, occurring mainly in the vicinity of tide water, but also about streams and lakes at some distance inland. It takes its name from its fondness for shellfish, crabs, and such aquatic life as is found along coasts and shores, but it also feeds on berries and grain and to a great extent on eggs and nestling birds, in fact, as Mr. Ridgway says: "Next to the Crow Blackbird I consider the Fish Crow the worst scourge our smaller birds have to contend with in the Class Aves. I doubt if even the domestic cat destroys so much bird life." Its habits are

similar to those of the Common Crow, though it is perhaps more graceful on the wing, a little less shy, and except during the cold months is less sociable. It usually nests three or four weeks later than its larger relative, but chooses similar situations and constructs a similar though smaller nest; pine trees are often selected for the site and not infrequently they are placed at a considerable height from the ground. The four or five eggs are smaller counterparts of those of the Common Crow. Throughout the greater part of Mexico the place is taken by the decidedly smaller, more lustrous plumaged Mexican Crow (*C. mexicanus*), while the larger of the West Indian Islands are tenanted by peculiar species which lack of space forbids mentioning in detail.

Jackdaw. — Turning now to the Old World, we find numerous representatives of the genus, perhaps none of them being more widely known, and it may be added more thoroughly detested, than the Jackdaw (*C. monedula*) of Europe, western Asia, and northern Africa. It is a "lively, noisy, and cheerful, eminently gregarious" bird, usually found in company with its larger relative, the Rook, and, says Mr. Hudson, "if he is not the first of his family in intelligence, he is certainly not behind any of them." Being of an adaptable disposition he becomes extremely tame when not molested, but is quick enough to scent real danger and to save his skin by the proverbial wariness of his race, and although destroyed on all occasions by gamekeepers, manages to hold his own. The Jackdaws feed largely upon insects, grubs, shellfish, and crustaceans, and to some extent on grain and probably eggs and young birds. As Hudson says: "The variety of sites he chooses for nesting purposes show how plastic are his habits. He breeds apart from his fellows, like the Carrion Crow; or in communities, like the Rook and Chough. He builds in hollow trees in parks and woods, in rabbit burrows, in ruins, in church towers and buildings of all kinds, and in holes and crevices in cliffs, whether inland or facing the sea, where he lives in company with the Rock Pigeon and the Puffin." The nest is a rude structure of sticks, straw, wool, and feathers adapted in size to its situation; the four to six eggs, which are usually laid in May, vary from greenish white to bluish green, thickly spotted and blotched with browns and olive.

FIG. 215. — Carrion Crow, *Corvus corone*.

Carrion Crow. — Very much larger, attaining a length of nineteen instead of only about fourteen inches, is the Black or Carrion Crow (*C. corone*) of Europe and northern Asia, an extremely cautious and wary species much resembling his American cousin (*C. brachyrhynchos*). Owing to his large presence and more or less evil repute he has been much persecuted, with the result that he has become quite scarce in many places, notably the British Islands, though still fairly abundant in other areas. Strong and direct on the

wing, the Carrion Crow is to some extent sociable and gregarious, often associating with Rooks and Jackdaws, except during the nesting season. They frequent pastures, fields, and especially the seacoast, and are varied in choice of food, perhaps preferring the dead and stranded fish, crustaceans, and carrion, often abounding in the latter place, but also feeding on young birds, eggs, the young of game birds and poultry, and even attacking newborn or weakly lambs; only when pressed by hunger will they eat berries. Although so very shy and wary, they frequently select conspicuous locations for their nests, such as a tree near a house, but on the coast they locate the bulky nest among cliffs; the four to six eggs are like those of the other members of the group.

Hooded Crows. — In Europe, chiefly in the north and east and thence extending in minor races as far as Siberia and India, is the allied Gray or Hooded Crow (*C. cornix*), which has the hood, throat, wings, and tail black and the remainder of the plumage ash-gray. Except in the matter of color this species is not to be distinguished in habits, notes, and nidification from the Carrion Crow. Not so, however, with the Indian Hooded Crow (*C. splendens*) of India and Ceylon, at least as regards habits. "This," says Blyth, "is the common Crow of India and is an abundant, very noisy, familiar, and impudent species, frequenting the vicinity of human abodes, alike in the village and in the crowded streets of large towns. About the latter, they walk and hop like domestic birds, wherever food is to be picked up, just stepping aside out of the way of the passer-by, and regardless of the ordinary throng; but they still retain all the craft and wariness of their tribe, and are ever vigilant, making off on the least suspicious movement, or even on the fixed glance of a stranger; they require but small encouragement, however, to be most troublesomely bold, and do not always wait for such encouragement, peeping into dwelling rooms, cawing loudly the while, passing through them by different windows, and, if opportunity offers, making off with anything that attracts them by the way. Though highly social, this Crow is not properly gregarious, and does not build in society, though from its commonness two or three pairs may resort to the same tree. Their noise, from the multitude of them, is incessant, and if anything excites them, is most uproarious and amazing; they are about, too, from the earliest dawn till late in the evening, and are far from being quiet on moonlight nights. Eager, busy, and bustling, their flight is always singularly hurried, as if time was a matter of some consequence to them; and in short every trait of the Crow tribe is prominently developed in this species." Another writer says: "Feeding Crows on certain occasions forms part of a religious ceremony with the Hindoos, and this share of the business is generally taken up by the women, with whom, accordingly, Crows become very familiar, nay, sometimes so bold as to take food from their hands."

Ravens. — The largest and most imposing member of this genus, and of the *Passeres* as well, is the Raven (*C. corax*), which, broadly speaking, is widely but often locally distributed throughout the entire Northern Hemisphere, though the tendency among ornithologists in recent years is to split up the species into

a number of more or less well marked geographic races, North America, for instance, laying claim to three such forms. But wherever found, whether in the burning deserts of the south or in the ice bound north, it is to all intents and purposes the same, and is, according to Newton, "probably the most highly developed of all birds. Quick sighted, sagacious, and bold, it must have followed the prehistoric fisher and hunter, and generally without molestation from them, to prey on the refuse of their spoils, just as it now waits, with the same interest, on the movements of their successors; while it must have likewise attended the earliest herdsmen, who could not have regarded it with equal indifference, since its now notorious character for attacking and putting to death a weakly animal was doubtless in those days manifested. Yet the Raven is no mere dependent on man, being able to get a living for itself; and, moreover, a sentiment of veneration or superstition has from very remote ages and among many races of men attached to it — a sentiment so strong as often to overcome the feeling of distrust, not to say hatred, which its deeds inspired, and though rapidly decreasing, even to survive in some places until the present time."

The typical form (*C. corax*) is found in Europe and northern Asia, and is approximately twenty-six inches in length, with a spread of wings of over three feet; the plumage is deep black, richly glossed, especially above, with steel-blue and purple. In most localities, where it was once fairly abundant, it is now extremely rare if not indeed already extirpated. For instance, it was once reasonably common throughout the British Islands, but it is now practically confined to a few strongholds along the northern coasts of Scotland and the neighboring islands, and has, perforce, become extremely wary and cautious. It frequents rocky localities and open country in preference to woodland, and solitary or in pairs, for they mate for life, may be seen in strong, not ungraceful flight, or heard uttering its deep, hoarse *croak*. It feeds on a great variety of things, such as grubs, worms, insects, grain, fruit, eggs, and nestlings, but is especially fond of carrion or fish cast up on the shores. It breeds early, generally in February or March, building a bulky nest of sticks, twigs, roots, etc., lined with wool and grass, placing it in a tree or more commonly on a ledge of rock on a cliff, and if unmolested making use of the same nest for several years. The eggs, four to six or exceptionally eight, are bluish green, spotted and blotched with dark brown.

American Ravens. — Of the two continental American races the larger, called the Northern Raven (*C. c. principalis*), inhabits mainly the Arctic and boreal provinces of North America, while the other decidedly smaller Mexican Raven (*C. c. sinuatus*) occurs throughout the western United States and southward through Mexico to the highlands of Honduras. The latter race is perhaps best known, being distributed over a vast area and usually resident where found, though sometimes wandering considerably in winter in search of food. The late Major Bendire, who enjoyed exceptional advantages for observing them, gives the Ravens a rather better character than its European congener appears to enjoy, stating that he has never observed them troubling young lambs or other domestic animals, and has frequently seen them feeding among his poultry on

apparently friendly terms with both young and old; other observers, however, have recorded their propensity for young chickens and eggs. Their principal food consists of carrion, dead fish, and frogs, varied with insects of various kinds, worms, snails, small mammals, and the refuse from kitchen and slaughterhouse. For a nesting site they almost always select a shelf on a cliff, placing the bulky nest under an overhanging ledge. They become much attached to a site and return to it year after year, although eggs and young may be taken for successive seasons. They lay from five to seven large pea-green or greenish olive eggs, which are usually profusely spotted and blotched with shades of brown, lavender, and drab. Both sexes take part in incubation, which lasts about three weeks, only one brood being reared in a season.

White-necked Raven. — Similar in appearance though decidedly smaller is the White-necked Raven (*C. cryptoleucus*), which is distinguished at once by having the feathers of the neck and breast pure white for at least the basal half. Inhabiting the Great Plains of the southwestern United States and central Mexico, it is a resident bird wherever found, occurring in the open plains and foot-hills, where it is often seen in fair-sized flocks, especially in winter. It is not so shy as its larger relative, oftener coming around slaughterhouses and camping parties to feed upon the refuse thrown out, but for the most part it finds its living in desolate and seemingly barren regions. It places the nest usually in a scrubby mesquite tree, oak, or tree yucca, only a few feet from the ground, making the foundation of sticks and thorny branches and lining it with hair, bark, wool, grass, etc. Nesting operations are begun late notwithstanding the warm climate, the three to eight eggs being deposited in May or June.

Rook. — With the Rook (*C. frugilegus*) we must close our account of this genus, this being a common and familiar species throughout the whole of Europe and especially in the British Islands. Although formerly regarded as highly injurious and still looked upon by the farmer and gamekeeper with a measure of disfavor, it has long been more or less protected and has now "come to regard the trees that are near a human habitation as the safest to build on." It is essentially a gregarious species and is seen in large or small flocks in pastures and fields, where it often follows the plow to pick up worms and insects, but it also feeds on dead fish, acorns, nuts, fruit, grain, and carrion. It nests in colonies, often of large size, placing the large bulky nests in high trees, which offer an uninterrupted view in all directions. Fearless of man during the breeding season, as soon as this is over and the young able to follow their parents, it usually leaves the rookery and joining in vast companies resorts to safer places to roost at night.

Nutcrackers; Clarke's Crow. — Perhaps most closely related to the last is a small genus of four species known as Nutcrackers (*Nucifraga*), which differ in their generally smaller size, nearly cylindrical bill, and gray or brown and white usually conspicuously spotted or streaked body plumage. They inhabit the great boreal coniferous forests, three of the species being natives of the Palæarctic region, and the other of the western portions of North America, the latter, or American Nutcracker (*N. columbiana*), being more commonly known as the

Clarke's Crow, from the fact that it was first brought back from the Columbia River region by the celebrated Lewis and Clarke expedition made across the continent in the early part of the last century. The Clarke's Crow is a very characteristic and striking bird of the Rocky Mountain region, attaining a length of twelve or thirteen inches, and having the plumage a uniform ash-gray, becoming white on the fore part of the head, while the wings and two middle tail-feathers are glossy black, the secondaries being broadly tipped with white, and the tail, except the middle feathers, mainly white. The habits of this bird are strongly suggested by a former generic name (*Picicorvus*), which implies a compound of Woodpecker and Crow, for such it seems to be, more than one collector imagining he had secured a new and strange Woodpecker until he held one in hand for the first time. Thus it not infrequently alights on a dead limb and hammers it precisely as a Woodpecker does, the rattle being audible for a great distance, and when flying from tree to tree they often swing themselves in the same undulating manner. On the other hand, their corvine tendencies are exhibited in the extreme watchfulness and loud, discordant notes. Except perhaps in the more northern parts of its range, they are very irregular residents, their coming and going depending apparently upon the food supply. They are decidedly gregarious, except during the breeding season, going about in noisy parties of from six to a dozen up to fifty or more, their ordinary flight being rapid, straight, and steady. Although quite omnivorous in their tastes, their winter food consists very largely of the seeds of various coniferous trees, especially pines, but at other times they feed on berries, insects, grasshoppers, and crickets, and they occasionally visit the slaughter-houses to feed on the offal, and in winter often come about the clearings of settlers where little that is edible appears to come amiss. I once shot one in the mountains of Montana that had no less than eighty-two pine seeds in its gullet. Ordinarily they are very shy and difficult of approach, often alighting on a dead limb or tree-top, from which point they watch carefully in all directions for possible enemies, and are ever ready with their loud, harsh *chaar, chaar*, to warn companions of danger. They do not very often descend to the ground, though when they do they walk easily and firmly like a Crow. They nest early, often long before the snow has left the ground, retiring to the higher ranges and building a compact, deeply cup-shaped nest of sticks, weeds, strips of bark and soft fibers, placing it well concealed in a coniferous tree. The three or four eggs are grayish, finely spotted with dark brown and lavender. The habits of the European Nutcracker (*N. caryocatactes*) are very similar to those of the American species, except perhaps that it is an even greater wanderer, often but very irregularly straggling far outside its usual range. For many years their nesting habits were unknown, but since it was discovered that they breed very early, at which time they are silent, the nests and eggs have been found in many places, and do not differ greatly from those already described.

Piñon Jay. — Another rather curious bird, intermediate in some respects between the Crows and Jays, which enjoys nearly the same distribution as Clarke's Crow, but mostly confined to the lower slopes of the mountains of the

arid region, is the Blue Crow, Piñon, or Maximilian's Jay (*Cyanocephalus cyanocephalus*). It is a small bird, ten inches long, of a nearly uniform dull grayish blue color, somewhat paler on the abdomen and darker on the head and neck, where it is an intense blue. The tail is short and nearly even, the wings long and pointed, and the bill long and depressed, with small, oval, entirely exposed nostrils. Of its habits, Coues says: "Notwithstanding its essentially corvine form, the habits of this bird, like its colors, are rather those of Jays. It is a garrulous and vociferous creature, of variously and curiously modulated chattering notes when at ease, and of extremely loud, harsh cries when in fear or anger. Like Jays, it is a restless, impetuous bird, as if it were of an unbalanced, ever frivolous mind, its turbulent presence contrasting strangely with the poised and somewhat sedate demeanor of the larger black *Corvi*. With these last, however, it shares a strong character, its attitudes when on the ground, to which it habitually descends, being Crow-like; and its gait and easy walk or run differing entirely from the hopping progression of the Jays. It shares a shy and watchful disposition with its relatives on both sides of the family; its flight is most nearly like that of the Clarke's Crow. It is highly gregarious in the strict sense of the term." It frequents especially the piñon-covered foot-hills of the lower ranges and is very erratic in its movements, being present in thousands one day and entirely absent the next. It subsists largely on the nutritious seeds of the piñon pine (*Pinus edulis*), but during the summer it also feeds on berries and seeds of various kinds as well as insects, especially grasshoppers. It nests somewhat in colonies, placing the large, deeply cup-shaped nest in the forks or on horizontal limbs of the piñon, at heights varying from five to fifteen feet from the ground. The four or five eggs are bluish white minutely specked and blotched with brown.

Magpies. — On the border line between the Crows and Jays, but perhaps best associated with the latter, are the Magpies (*Pica*), of which there are several species occurring in both the Old and New Worlds. They are larger birds than the last, with a long and much-graduated tail, covered nostrils, partially naked orbits, and rounded wings in which the outermost primary is falcate. The coloration is mainly black and white in large, conspicuously contrasted areas, the wings being metallic greenish blue varied with greenish or violet, while the tail is rich metallic green varied with bronze, purple, and violet near the end, the shoulders, abdomen, sides, and flanks being pure white. The American Magpie (*P. pica hudsonia*), which is deemed but a subspecies of an Old World form, is a striking bird some twenty inches in length, of which, however, the tail makes up rather more than half; it occurs in the Western States from Arizona and New Mexico to Alaska. It frequents the treeless or more sparsely wooded districts, being partial to the vicinity of streams and brushy valleys, but often wanders into the pine groves on hillsides. While not exactly gregarious, it is sociable and usually seen in small, loose parties of from five or six to a dozen or more, and enjoys but weak powers of flight, being particularly bothered by high winds. It is very noisy, more or less quarrelsome, and one of the most mischievous and thieving of birds, nothing seeming to delight it better than

to terrorize small birds by imitating the cry of a Hawk. Ordinarily it is extremely shy, but if not molested it becomes quite tame, though always alert for possible trouble. It is very voracious, living upon carrion, insects of various kinds, berries, fruits, offal from slaughterhouses and refuse generally, and is very destructive to the eggs and young of other birds. It is reputed to alight on the backs of domestic animals and by pecking at chance sores or abrasions to cause sometimes the death of the animal, on which account it is often exterminated by ranchmen. It usually seeks a more or less retired situation during the breeding season, and constructs a large and quite elaborate domed nest, ordinarily at no great height from the ground. It is placed in the fork of a small bushy tree and is composed externally of large sticks firmly wedged together, "upon this a layer of smaller twigs, and then a layer of fine clay one half or three quarters of an inch in thickness, which, being applied soft and well worked in, becomes very hard and binds the whole structure together. On this again is a soft lining of twigs, hair, feathers, and any proper material they can find. Over the whole, rising from the walls of the nest, is a dome of twigs and sticks, very ingeniously and securely woven together. There are two openings, opposite each other, evidently to make room for the long tail of the bird." The six to nine eggs are generally pale gray, heavily blotched with different shades of brown. The Magpie is a very intelligent bird, making an interesting but sometimes troublesome pet, and can be taught to articulate words and short sentences. One of the most accomplished of these birds I saw some years ago in southwestern Colorado. This bird was the property of a station agent of a railway line and occupied a large cage on the station platform, becoming especially talkative at train time. The bird was appropriately named "Maggie." The exhibition would start usually in the following order, each word being uttered with astonishing distinctness and with perfect human inflection: "Pretty Maggie, pretty Maggie; Maggie's all right." Then would come the information, "Martin's a crank, Martin's a crank," followed by the emphatic statement, "Martin's drunk." After this would often come the heartiest, jolliest laugh one could imagine, and said to be in exact imitation of that of the mistress of the house. The late Professor W. C. Knight, in his "Birds of Wyoming," has given accounts of several talking Magpies that came under his observation. The Yellow-billed Magpie (*P. nuttalli*), which has the bill and bare orbital spaces bright yellow instead of black, is found only in middle California, where it is resident; its habits and nidification are the same as those of the commoner species, as in general are those of the Old World representatives.

Magpie-Jays. — In some respects quite closely related to the Magpies, but differing in having the nostrils wholly exposed, the orbits entirely instead of but partially feathered, and a conspicuous crest, are the so-called Magpie-Jays (*Calocitta*) of western Mexico and thence to Costa Rica. Of the two species comprising the genus, the best-known — and the one made the subject of our colored illustration — is Collie's Magpie-Jay (*C. colliei*), or the Urraca Jay, as it is commonly called in western Mexico. The coloration is so well shown in the plate that it is only necessary to say in way of description that the total length of the bird

is about twenty-four inches, of which some seventeen inches are taken up by the handsome, much-graduated tail. In its habits, so we are told by Colonel A. T. Grayson, it is a typical Jay, being addicted to mimicry, gesticulation, and a propensity for thieving, robbing birds' nests of eggs and young, etc. "It is generally met with in the thick and voluptuous forest of the *tierra caliente*, near the Pacific coast, where it is a common, though an interesting, bird to the traveler or native, and generally elicits a full share of admiration as he appears conspicuous among the numerous gaudy tenants of his native woods." The Magpie-Jay builds a bulky nest composed of thorny twigs and lined with fibers of roots and grass; the eggs, according to Ridgway, are unknown to science.

Jays. — The Jays constitute a large and varied group (*Garrulinæ*) of both Old and New World birds in which the tail is nearly as long as, or sometimes much longer than, the wing, which is comparatively short and rounded, with the fifth to seventh quills longest. By the accident of discovery the typical members of the subfamily are referred to the genus *Garrulus*, the dozen or more species of which range throughout the western and temperate regions of the Old World, the Jay *par excellence* being *G. glandarius*, which inhabits the whole of Europe to about 64° north latitude and thence east to the Ural and south to the Mediterranean. It is a rather handsome bird, nearly fourteen inches long, with the general plumage a fine reddish brown, darker above, varied with black, white, and beautiful blue, the head-crest being whitish, striped with black. It frequents the dense foliage of woods and thickets as well as gardens and hedgerows, and years of persistent persecution at the hands of man has made it an exceedingly wary and suspicious bird, constantly moving about and elevating, depressing, and flirting the wings and tail, and alternately rising and lowering the crest and otherwise acting in a nervous and excitable manner. When startled or annoyed, its cry is extremely loud, harsh, and discordant, while at other times it has a number of lower monotonous notes, and is said to even mimic other birds. It constructs a rather neat but bulky nest of sticks and twigs, lined inside with rootlets, fine grass, etc., placing it in a bush or low tree and well concealing it amidst the dense foliage. The five or six eggs are grayish white or greenish gray, thickly spotted all over with pale brown. This Jay has an extensive menu, feeding in summer on fruits, berries, and certain garden vegetables, with insects, eggs, young birds, mice, etc., and in winter on nuts, snails, insect larvæ, and late berries.

Blue Jay. — As it will be impossible to adequately describe all the members of this subfamily, we may select from among them a few of the best-known, beginning with the handsome Blue Jay (*Cyanocittà cristata*), which is one of the commonest and most beautiful birds of eastern North America. It is nearly a foot in length, the upper parts being grayish blue and the lower parts dusky whitish, with a black band on the forehead, sides of the neck and breast, the wings and tail being bright blue, barred with black and white; the conspicuous crest is nearly like the back. For the greater part of the year, as Bendire well states, the Blue Jay is a more or less restless, noisy, and roving bird, moving in little companies from one wood to another and making the welkin ring with its loud

COLLIE'S MAGPIE-JAY
(*Calocitta colliei*)

djah, djah, but during the nesting season he becomes more quiet and retiring. It is a hardy bird, generally a resident throughout its range, though some of the more northern birds may migrate to the southward for a few months. It prefers mixed woodland and the borders of clearings, being for the most part very shy and difficult of approach; but in localities where it is not much molested, as in certain of the middle Western States, it becomes quite tame, coming about gardens and houses in the towns and villages. They are very fond of mobbing large birds, especially Hawks and Owls, and no sooner is one discovered than a few wild cries call all within hearing, but occasionally the tables are turned and an over-venturesome Jay makes a meal for a Hawk. Aside from their ordinary notes they have a great variety of calls and cries, imitating to perfection the alarm notes and cries of distress of other birds, and seem to take mischievous delight in causing consternation among them. The Blue Jay is perfectly omnivorous, feeding on offal, insects, grasshoppers, grubs, worms, mice, the eggs and young of smaller birds, as well as acorns, beechnuts, Indian corn, and various fruits. They are especially active in spying out the nests of other birds and often despoil them, but they are careful enough in concealing their own nests, placing them in dense coniferous jungles, thorny and vine-clad thickets, or thick shrubbery. The nest is rather bulky, being composed of small twigs, rootlets, etc., lined with wool, strings, rags, leaves, and grasses, and sometimes a little mud; the three to six eggs are pale olive-green or brownish ashy, more or less blotched with various shades of brown. A smaller and paler race, known as the Florida Blue Jay (*C. c. florincola*), inhabits the peninsula of Florida.

Fig. 216. — American Blue Jay, *Cyanocitta cristata*.

Steller's Jay. — The only other species of the genus is *Cyanocitta stelleri*, which in some seven or eight more or less well-marked geographic races spreads over most of western North America and southward through the highlands of Mexico and Guatemala. In coloration the typical form has the head, including the long crest, neck, and upper chest, black, the back and scapulars plain sooty brown or grayish, and the rump and lower parts blue, while the wings are various shades of blue, the coverts barred with black and without the white tips as in the eastern Blue Jay; the various subspecies are based on differences in size, the presence or absence of a white spot over the eye, etc. Steller's Jay (*C. stelleri*), also known as the Mountain or Pine Jay, inhabits the coniferous forests of the North Pacific coast district, from Puget Sound northward. "Like its relative, the common Blue Jay," says Major Bendire, "it is an incessant scold, never at rest, fully as inquisitive, prying into the domestic affairs of other

birds, and I think equally destructive. It is usually a constant resident and breeds wherever found. It is an inhabitant of the canyons and pine-clad slopes of the higher mountains, and is not as often seen in the deep forests as on their outskirts near watercourses. Although rarely molested, it is exceedingly shy and more difficult to approach within gunshot range than is the Blue Jay." Its feeding habits, however, are similar except that it makes perhaps greater use of pine seeds. Its nest, in the construction of which mud always enters, is placed in a coniferous tree at heights varying from five to fifty or sixty feet. The eggs are pale bluish green, spotted and blotched with brown and lavender.

The **California Jay** may be taken as typical of a large genus of medium-sized American Jays (*Aphelocoma*) which are without a crest and have the prevailing color of the plumage uniform blue or blue and gray. The California Jay (*A. californica*), as its name implies, is found in the Pacific coast district from southern California north to southwestern Washington, and east to and including the eastern slopes of the Sierra Nevada and Cascade ranges, frequenting the oak-covered foot-hill regions, the brush-covered canyons, and lower agricultural districts, where it does an immense amount of damage in destroying eggs and nestling birds, fruits of all kinds as well as sprouting grain, and is often known to enter poultry houses in quest of eggs. Not nearly so shy as the species before mentioned, it appears to be on the increase and comes readily into the shrubbery about villages and towns. Its notes are harsh and rasping, and like its relatives it possesses the power of mimicry and takes the same delight in mobbing Owls and other large birds. The nest is usually placed in a low bush, thicket, or hedge, and the complement of eggs varies from three to six, the usual number being four or five.

Florida Jay. — Not greatly different from this is the Florida Jay (*A. cyanea*), or Scrub or Bush Jay, as it is called locally, which is practically confined to the impenetrable thickets of scrubby oaks and stunted pines, and although not particularly shy, generally manages to keep pretty well concealed amongst the underbrush. In favorable situations they are said to breed in loose communities, probably rearing two broods.

Siberian and Canada Jays. — All travelers in the northern coniferous forests have doubtless met with the fluffy, gray-plumaged Jays of the genus *Perisoreus*, which at first sight suggest gigantic Titmice. About twelve inches in length, they are without a crest, but have the feathers of the back and head very long and soft, the prevailing color in the American form being uniform dusky grayish, becoming whitish beneath. Of the three species the Siberian Jay (*P. infaustus*), which has the back and under parts lead-gray, the rump and tail-feathers largely rufous, is found in northern Europe and Asia, the others being natives of North America, the best-known being the Canada Jay (*P. canadensis*), which in several geographic races spreads over most of the northern country and southward in the Rocky Mountains almost to Mexico; in the Pacific coast region it is replaced by the Oregon Jay (*P. obscurus*). The Canada Jay, which is locally known as the Whisky Jack, Moose Bird, Meat Bird, Camp Robber, and Venison Hawk, is one of the most characteristic inhabitants of the extensive pine, spruce,

and tamarack forests, coming fearlessly about the camps of hunters and lumbermen as well as the cabins of lone residents. If unmolested, they soon become very familiar, being, as Mr. Manly Hardy says, "the boldest of our birds, except the Chickadee, and in cool impudence far surpass all others. They will enter tents and often alight on the bow of a canoe when the paddle at every stroke comes within eighteen inches of them. I know of nothing that can be eaten that they will not take, and I had one steal all my candles, pulling them out endwise one by one from a piece of birch bark they were rolled in, and another pecked a large hole in a cake of castile soap. A Duck which I had picked and laid down for a few minutes had the entire breast eaten out by one or more of these birds. I have seen one alight in the middle of my canoe and peck away at the carcass of a beaver I had skinned. They often spoil deer saddles by pecking into them near the kidneys. They do great damage to the trappers by stealing the bait set for martens and minks and by eating trapped game; they will spoil a marten in a short time. They will sit quietly and see you build a log trap and bait it, and then, almost before your back is turned, you hear their hateful *ca-ca-ca* as they glide down and peer into it. They will work steadily, carrying off meat and hiding it. They eat insects of different kinds, and I have found carrion beetles in their crops; they also eat the fungi and mushrooms growing on stumps, using these largely when other food is scarce. They are fond of the berries of the mountain ash, and, in fact, few things come amiss." Another writer adds, "They will eat anything from soap to plug tobacco." The Canada Jay is an early breeder, building its open bulky nest long before the snow has left the ground, usually placing it in a dense coniferous tree and at no great distance from the ground. The four or five eggs are pale gray or pearly gray, profusely flecked and spotted all over with light olive-brown. The habits and appearance of the other forms are practically identical.

Fig. 217. — Red-billed Chough, *Graculus graculus*.

Choughs. — Usually placed with the *Corvidæ*, and forming the final subfamily, is a small group of remarkable and interesting, exclusively Old World, birds known as Choughs, the exact systematic position of which can hardly yet be considered as definitely settled. They are typified by the European or Red-billed Chough (*Graculus graculus*), a large Crow-like bird, about sixteen inches in length, with long, pointed wings and a comparatively long, slightly curved and sharp-pointed bill. The plumage is black throughout with purple and green reflections, the bill and legs being deep vermilion-red. Although evidently of ancient lineage, since remains of this and an allied species have been found in French caves in deposits of the reindeer age, they are now clearly decadent

and it seems not unlikely are on the road to extermination. Once fairly common in the British Islands, it is now sadly depleted and hardly holds its own, being confined to a few isolated points along the rock-bound coasts where there are precipitous cliffs, while in other parts of Europe and northern Africa it has been pushed away from the coasts and now inhabits only the high mountains inland. "In size, flight, language, habits, and general apearance," says Hudson, "the Chough comes nearest to the Jackdaw, but it is a much handsomer bird. Its cry, uttered both when perched and when on the wing, differs only from that of the Daw in its more ringing and melodious sound. Its flight is easy and buoyant, and the birds are fond of aërial pastimes, similar to those of the Jackdaw, during which the members of the company pursue one another in play, and frequently tumble down from a great height through the air as if disabled. They feed inland, often going long distances from the cliffs they inhabit to seek their food, like Rooks, in meadows and pasture lands. They also follow the plow to pick up worms and grubs, and are said to eat carrion, berries, and grain. On the sand and rocks they feed on the animal refuse left by the tides." The Chough lives in communities, placing the large bulky nest in a hole or crevice in the most inaccessible part of the cliffs, lining it with rootlets, wool, hair, etc. The four to six eggs are white, spotted and blotched with brownish.

Alpine Chough. — Inhabiting the mountains of southern Europe and thence eastward to the Himalayas is a slightly larger species, the Alpine Chough (*Pyrrhocorax pyrrhocorax*), which has a much shorter bill, the color of which is yellow, with a slight orange tinge. It spends the summer at elevations up to 15,000 feet or over, but in winter comes down into the valleys, though never to the seacoast. Its habits, notes, and nidification are similar to those of the former species.

Australian White-winged Chough. — Australia possesses a representative of this group in the remarkable White-winged Chough (*Corcorax melanorhamphus*), which frequents the open forest land of the interior over a large area. It is sixteen or more inches in length and has the plumage black, with glossy green reflections, set off with scarlet eyes, while the inner webs of the primaries are white. It goes about in small parties of from six to ten individuals and is very tame and confiding, gaining most of its livelihood upon the ground over which it runs with considerable swiftness. Of its habits Gould says: "During flight the white markings of the wing shows very conspicuously, and on alighting the bird displays many curious actions, leaping from branch to branch with surprising swiftness, at the same time spreading the tail and moving it up and down in a very singular manner; on being disturbed it peeps and pries down upon the intruder below, and generally utters a harsh, grating, disagreeable, and tart note; at other times, while perched among the branches of the trees, it makes the woods ring with its peculiar, soft, low, very pleasing but mournful pipe." It builds a large, conspicuous, bowl-shaped nest of mud scantily lined inside with stringy bark, grass, and sometimes feathers, placing it on a horizontal limb of a tree. It appears that all the members of a party combine in building the nest and perhaps as many as four or five females deposit their eggs in it,

though the exact number laid by each is unknown; five to eight eggs are commonly found in each nest, these being yellowish white, rather boldly blotched with olive and purplish brown. As soon as the young are hatched, another nest is built, and so on until three or more broods are reared in a season, which extends from September to December.

Ground Choughs. — The remaining genus of the group comprises some four or five species known as Ground Choughs (*Podoces*), all of which are confined to the sandy, barren districts of central Asia. They have very short wings, which they use but little, being essentially ground birds of great fleetness of foot. As they dwell in such inaccessible localities they are but little known, Pander's Ground Chough (*P. panderi*) of Transcaspia and Turkestan being perhaps best known. It is observed singly or in pairs and seems to mate for life, seldom perching on a bush and rarely taking to wing. It feeds on insects and seeds and builds its nest in a hole in the ground, laying three or four greenish gray, spotted eggs. About ten inches long, this species is blue-gray above, becoming creamy vinous on the rump, with the chin, throat, and under tail-coverts white, while the wings are black and white and the tail black, as is a small spot in front of the eye.

THE STARLINGS

(Family *Sturnidæ*)

The present family is usually made to include the true Starlings, Mynas, and the so-called Glossy Starlings, which are here set aside as a separate family (*Eulabetidæ*), and, although it must be confessed the characters separating them are not great nor seemingly very important, they are perhaps as important as those characterizing many other oscinine "families." The true Starlings are birds of medium size with strong tarsi and feet, usually a rather long, pointed bill, the rictus entirely without bristles of any kind, and a moderately long, pointed wing in which there are ten primaries, the first one, however, being often minute. The tail of twelve feathers is extremely variable, ranging from relatively long to short, and from much-graduated to square or even forked. The plumage is in the main black, often brilliantly glossed with bronze, coppery, purple, and lilac, and occasionally there is bright yellow; the sexes are alike or nearly so and the plumage of the nestling is typically streaked below; a number possess fine crests.

The Starlings are quite widely distributed over the Old World, having their center of abundance in the Indian and Ethiopian regions, with a number entering the Palæarctic region, and one — the Common Starling (*Sturnus vulgaris*) — occasionally straying to Greenland and recently introduced into eastern North America; they are, however, absent from Australia and New Zealand, except as introduced species. A few of the forms are migratory, but the majority are resident, and practically all are gregarious, going about often in large flocks. While they frequent trees to some extent, they are mainly terrestrial, walking

easily and gracefully on the ground, where they secure the principal portion of their food, which consists mainly of grain, seeds, berries, and insects. They place their usually bulky nests in holes in trees, cliffs, or about buildings, or a few in the branches of trees, and uniformly lay unspotted eggs of various tints of blue.

The **typical Starlings** (*Sturnus*) have the bill about as long as the head, the wings long and pointed, and the tail short and square, while the feathers of the head, throat, and breast are hackled; the color is black glossed with greenish, purple, or lilac. The sexes are similar, the female being usually a little less brilliant, but there are quite marked differences between the winter and summer plumages, due, however, to the wearing away of the buff tips to

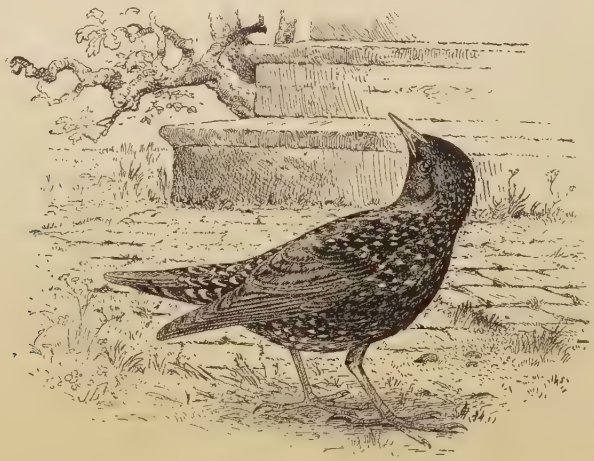


Fig. 218. — English Starling, *Sturnus vulgaris.*

the feathers at the beginning of summer. The common species of western Europe (*S. vulgaris*) is easily distinguished by having the head, throat, shoulders, and wing-coverts green, and the flanks steel-blue or greenish blue. This species is a common and familiar bird throughout most of its range, and being very adaptable in disposition, has increased enormously of late years, notably in England, where it is a universal favorite. It is a sturdy, hardy bird on which the weather has very little effect, being partially migratory and partially stationary, breeding abundantly in central and northern Europe and during the cold season retiring more or less completely to southern Europe and northern Africa. Gregarious at all times, even during the nesting season, it frequents fallow fields, pastures, and meadows, often in company with its larger relative, the Rook, and during the winter and early spring subsists almost entirely upon various insects and their larvæ, of which it destroys incalculable numbers. It also frequents the larger city parks and landed estates, and in summer adds to its

bill of fare grain, seeds, and certain fruits, especially mulberries, cherries, and occasionally ripe pears and apples, which latter cause it at times to be regarded as somewhat of a pest. It begins nesting in April and May, usually placing its loosely constructed nest in crevices in buildings, but to some extent in holes in cliffs, in company with Rock Doves and Guillemots, or in Martins' holes in banks. The five to seven eggs are light greenish blue; often two broods are reared in a season. After the young are able to care for themselves they congregate with the parents in vast flocks, which resort each evening to some chosen roosting place where they congregate in tens and even hundreds of thousands, resembling, as they whirl and turn, a gigantic black cloud. For an hour they may alternately alight and circle about before they finally settle for the night, with the accompaniment of multitudinous and almost deafening calls. The Starling enjoys the reputation of being an accomplished singer and great mimic, producing, it is said, with astonishing fidelity, the call notes of Goldfinches and other birds, or even the sounds of human activity, but Mr. Hudson insists that its supposed accomplishment is due, not so much to conscious imitation as to the fact that it naturally possesses a great variety and range of call notes from which it is possible to select ones resembling those of other birds. Its own more distinctive notes, which are most frequently heard during the breeding season, are clear whistled calls.

About 1890 some sixty of these Starlings were liberated in Central Park, New York City. They took kindly to their new surroundings, nested in near-by buildings, and having passed several of our severe winters may be considered as successfully introduced. They have spread to other parts of the city, especially to the Zoölogical Gardens and the Bronx and to Staten Island. Dr. Beebe, of the New York Zoölogical Park, states that they are becoming very numerous there, and are displacing many native birds by appropriating their nesting boxes, etc. They were introduced into Australia in 1863 and are now abundant in Victoria and Tasmania.

Purple-winged Starling. — Extending from southeastern Europe through Asia Minor to Afghanistan is the Purple-winged Starling (*S. purpurascens*), which differs from the last in having the wing-coverts, shoulders, and rump purplish, the throat bronze, and the abdomen purple or bronze-purple, while in southern Europe and northwest Africa the place is taken by the Black or Sardinian Starling (*S. unicolor*), which is black, glossed with violet-purple; the habits of these are in the main identical with those of the common species.

Rose-colored Starling. — One of the handsomest members of the family is the Rose-colored Starling (*Pastor roseus*), which occurs principally in eastern Europe, Asia Minor, and central Asia, or occasionally and erratically in other parts of Europe, and retires to India and Ceylon in winter. It differs from the true Starlings in possessing a shorter bill, very long, pointed wings, and an extremely long and full crest, the feathers of which are sharp pointed. The sexes are practically similar, the adult in summer having the head, neck, fore breast, wings, tail, and thighs glossy black, while the back, rump, breast, and abdomen are rich pale rose-color; during the winter the black feathers of the

head, throat, and neck are tipped with buff, but toward summer these wear off into the other plumages; the young birds are light, grayish brown above and buffish white below. Its habits are in general similar to those of other Starlings, it being usually found in large flocks and feeding during summer mainly on insects, but at other times on grain, seeds, and fruit such as that of the mulberry. They are very lively, vivacious birds, always busy and restless, running here

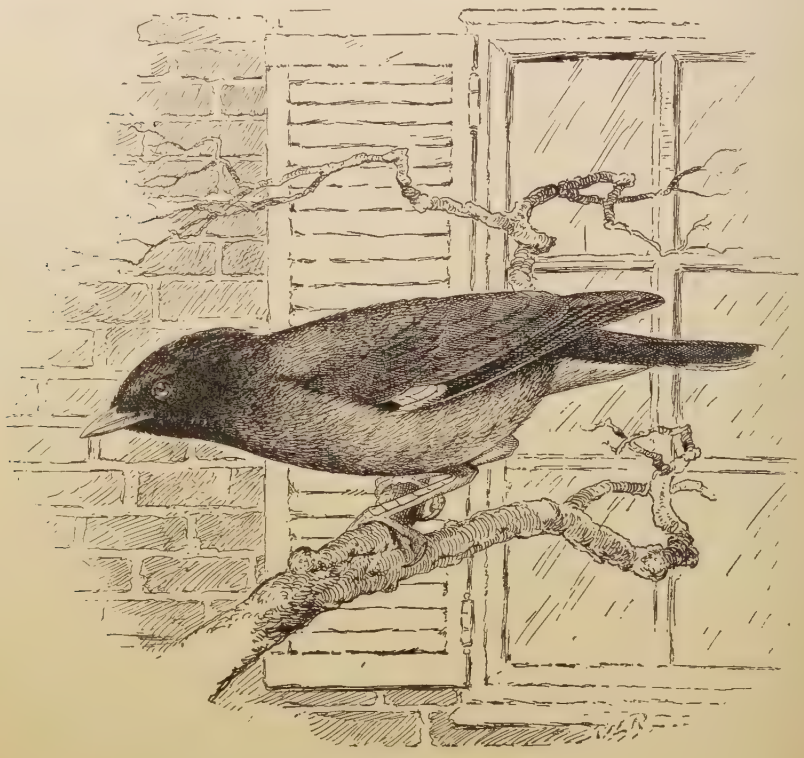


Fig. 219. — Common Indian Myna, *Acridotheres tristis*.

and there or quarreling among themselves, and giving voice to their harsh, chattering song. They breed largely in Asia Minor, nesting in vast communities, usually on rocky hillsides, and placing the large, loosely constructed nest on the ground, under stones or even in the open; the three to five eggs are white or bluish white and of course unspotted.

Mynas. — Under the Hindustani name of Myna, which in that language signifies a Starling, there are several rather closely allied genera which are more or less worthy of mention, among them *Sturnia*, which is characterized by having the bill shorter than the head, slender, and slightly curved, a decidedly

wedge-shaped tail, and very soft, silky plumage; the sexes are alike, and the young are brown until the first autumn. According to Mr. Oates the half dozen Indian species are more arboreal than the true Starlings, being found constantly on trees, feeding on insects and the nectar contained in flowers, but also feeding on the ground a good deal. They go about in flocks, have chattering notes, and make their nests in holes in trees or occasionally in the roofs of houses.

The sole tenant of its genus, the Gold crest Myna (*Ampeliceps coronatus*) of Cochin China and portions of India, is known by its moderate crest, large naked space around the eyes, and bright black and yellow plumage, the latter color being confined to the crown, chin, and throat; it nests in deep holes in forest trees.

Passing over a number of other genera, we may describe briefly the Common Myna (*Acridotheres tristis*), an abundant and familiar bird throughout the entire Indian region and introduced into other parts of the world, notably the Hawaiian Islands, where it exists in vast numbers. About ten inches long, it has the upper parts, breast, and sides brown, and the head and neck black, while there is a bare patch of yellow behind the eye, the wings are barred with white, and the lower parts are white; the short, blunt bill is yellow; the nasal and frontal plumes are lengthened and erect or curled backward, and the crown-feathers are elongated and pointed. They are mainly ground-haunting birds, going about in large flocks and feeding largely upon insects. They have a great variety of notes, some harsh and others very pleasing, and build their loose nests in holes in houses or trees or sometimes they construct a bulky nest in the branches of a tree; they usually lay five eggs. In the Hawaiian Islands this species has the reputation of destroying the eggs and young of other birds, but Mr. Henshaw has not seen them do this, and doubts if they do.

Ox-peckers. — Among the many forms of this family inhabiting the Dark Continent we have space to mention only the Ox-peckers (*Buphaga*), so called from their fondness for being around domestic and other cattle which they rid of various parasites. They are quite unlike typical Starlings, having a stout, nearly straight bill which is broad at the base, bare nostrils, long, pointed wings, and especially strong feet with long curved and sharp claws by means of which they cling to the cattle's sides; in color the plumage is mainly grayish brown. The African Ox-pecker (*B. africana*), which inhabits northeastern Africa, Senegambia, and the Transvaal, is generally met with in small flocks, and is sometimes called the Rhinoceros Bird from its accompanying this animal. Of its habits, Mr. Ayres writes as follows: "During our stay in the bush, Ox-peckers appeared in numbers about our oxen, and actually ate large holes in the fleshy parts of their backs, often one or two inches deep and two or three inches in diameter, thus creating bad sores. They do this little by little and day by day, attacking just that part of the back where the ox cannot swish them off with its tail or dislodge them with its horns. This species is a pest to the hunter, of whose approach it warns the buffalo and rhinoceros by its loud, harsh note, which is perfectly understood by its huge friends. I have not seen any

holes picked by these birds in the buffalo or other game, but only in the cattle." Of the Red-billed species (*B. erythrorhyncha*) of Natal, Mr. Ayres also says: "These are among the useful birds, their food consisting of the acari or ticks which they pick from the cattle. They run and climb all over an ox, much as a Woodpecker would about the stem of a tree. The cattle, for the most part, much enjoy the operation, and may be seen with tail partially extended, standing perfectly motionless. These birds are mostly seen in small companies, varying from three to ten; their flight is rather heavy and their notes harsh but not loud." Nothing seems to be recorded regarding their breeding habits.

THE GLOSSY STARLINGS AND GRACKLES

(Family *Eulabetidæ*)

As pointed out under the last family, the present group is but slightly differentiated from it, almost too slightly it would seem, since the only "characters" are the possession of rictal bristles, strictly arboreal habits, and the production of spotted eggs; otherwise they are *Sturnidæ*. Like the true Starlings they are confined to the Old World, occurring especially in Africa, India, and thence through many of the islands to Australia, the typical genus being *Eulabes*, the members of which are variously known as Grackles, Hill, Talking, or Wattled Mynas. Approximating ten or twelve inches in length, they are known by the glossy black plumage and (with one exception) by the presence of fleshy yellow or orange wattles or bare spaces on the sides of the head. In addition to these characters it may be mentioned that they have a thick, slightly curved bill, very weak rictal bristles, rather blunt wings, and a short, nearly square tail. They are chiefly found in hilly forests, where they keep mostly to the tops of the highest trees, never descending to the ground, and feeding chiefly on fruits. They have a great variety of natural notes, and as they are easily taught to repeat words and various sounds, they are frequently kept in confinement by the natives of India, making very engaging pets. For a nesting site they select a natural cavity in a tree which is slightly lined with grass or leaves, and wherein they deposit usually two eggs, which are pale blue or green, "spotted and splashed with purple and chocolate-brown." Perhaps the best-known species is the Southern Hill Myna (*E. religiosa*) of the hilly and well-wooded portions of southern India and Ceylon; it is known by having two elongate, bare patches on the sides of the head, which are rich yellow in color, by a white patch at the base of the primaries, and citron-yellow legs and feet and orange-yellow bill.

The **Glossy Starlings**, or **Tree Stares** (*Calornis* or *Lamprocorax*), comprise upward of twenty forms, which range from India through the Malay Peninsula and islands, the Philippines and New Guinea to northern Australia. Lacking the wattles, so conspicuous in the last genus, they have a long, sharp-pointed wing and a fairly long, considerably graduated tail; the plumage is black, often beautifully glossed with green, purple, violet, and lilac. Perhaps the most

beautiful species is the Shining Starling (*C.* or *L. metallica*) of northern Australia and the island groups to the northward, which has much of bright reddish purple on head and mantle, and brilliant, glossy green in the form of a neck collar. It is a stationary, gregarious species, usually seen in small flocks in the scrubs and more open forests, flying much after the manner of the English Starling (*Sturnus vulgaris*), and like that species making a chattering noise while on the wing. Its food consists apparently entirely of seed, fruits, and other vegetable matter. They nest in colonies, using the same tree season after season, and constructing a large, pendent nest some two feet in length and one in breadth, somewhat oval in shape, slightly compressed and rounded both below and above, when it tapers to a neck, where it is attached to the branch; the nest is composed of long tendrils of a climbing plant and lined with finer pieces of the same or strips of palm leaves. The entrance hole, which is often hooded, is in the center of the widest part; the two or three eggs are bluish or greenish white, spotted and blotched with brown and dull purple. The nesting tree selected is often one of gigantic size standing alone, and frequently has its branches literally hung with these pensile nests, so closely placed in fact that they often touch. One at Cape York observed by Mr. Barnard contained 296 nests, and many others containing nearly as many have been recorded. The birds go about in flocks even when collecting building material, and the noise created about a nesting tree is said to be almost deafening. The only Indian species (*C.* or *L. chalybeus*), according to Mr. Oates, "breeds in holes of trees, in the recesses of old bridges and buildings, in holes in banks of rivers, and in the tops of palm trees," and lays usually three eggs.

African Glossy Starlings. — With an account of two genera of African Glossy Starlings we may appropriately close our notice of this group. They are very beautiful, trimly built birds with brilliantly glossy plumage in which there are hues of resplendent green, purple, violet, lilac, and coppery. The two genera are separated largely on the length and shape of the tail, this in *Lamprotornis* being long and graduated, whence they are called the Long-tailed Glossy Starlings, while in *Lamprocolius* the tail is short and square. Ranging throughout practically the whole of the continent, they are all gregarious birds, going about in small or sometimes vast flocks and feeding upon both vegetable and animal substances. They keep mainly to the tops of the highest forest trees and have a direct, rapid flight; their notes are described as rather harsh and unmelodious. Their nests are usually placed in holes in trees, though some build a cup-shaped nest in the branches of trees; the four to six eggs are greenish blue and much spotted.

Burchell's Glossy Starling. — One of the most beautiful members of the long-tailed group is Burchell's Glossy Starling (*Lamprotornis australis*) of Southeast Africa. It is about fourteen inches long and has the plumage of a bright resplendent green, with the ear-coverts and a half collar of violet-purple. Mr. Andersson found it abundant in certain portions of Damara Land, passing most of its time in the high trees, though occasionally descending to the ground in search of insects, which with berries constitute its principal food. He found

it a very shy but lively bird, continually jerking its body and tail, and uttering its harsh, clamorous notes.

The **Red-shouldered Glossy Starling** (*Lamprocolius phœnicopterus*) of the eastern portions of South Africa is likewise a handsome species, with the plumage of a sea-green, glossed on head, rump, tail, and thighs with blue, and on the ear-coverts with violet, while the greenish blue shoulder-coverts are margined by a flame-colored and violet band; its length is about ten inches. It much resembles the European Starling (*Sturnus vulgaris*) in manners and habits, frequently congregating in large flocks, and is often met with near villages. Its food, according to Mr. Andersson, is very various, consisting of seeds, berries, and insects, and it is very destructive to fruit gardens. Its nest, well lined with feathers, is placed in a cavity in a tree. The Splendid Glossy Starling (*L. splendens*) of West Africa has the general plumage of a brilliant metallic golden green, and the Green Glossy Starling of Northeast Africa and Senegambia is glossy steel-green and steel-blue. Their habits are in general similar to those of the other species.

THE HONEYEATERS

(Family *Meliphagidæ*)

A resident of the New World visiting Australia and certain of the near-by islands might be excused for imagining that he had discovered, in the numerous active, bright-plumaged birds clinging amongst the flowers a bond of avian affinity between these widely separated parts of the world; but, although somewhat suggesting the Hummingbirds, the Honeyeaters, for such they are, are really widely separated from them. They are, moreover, as peculiar and striking a feature in the ornis of the Australian and New Zealand regions as are the Hummingbirds on the American continent, — in fact, as Mr. Gould says, they are to the fauna what the peculiar eucalypts, banksias, and *Melaleucæ* are to the flora. To go farther, each seems to be essential to the other, the trees supplying nectar and attracting insects, while the birds render important assistance in transferring pollen from one flower to another.

The Honeyeaters constitute a fairly compact group of mostly small birds, few members of which exceed a Thrush or Jay in size, while most of them are hardly more than half that length. They have a slender, sharp-pointed, more or less lengthened and decurved bill, basal nostrils, and a long, protractile tongue which is bifid and terminates in a brush, the whole constituting a curious suctorial organ. The lower mandible is usually serrated, but no group characters can be drawn from the wings or tail, as they, together with the tarsi, vary in length and shape. A marked peculiarity of many forms, however, is the presence of bare spaces on various parts of the head, while wattles on the ears, cheeks, or throat are of common occurrence. The prevailing colors of the plumage are green and yellow, blue being entirely absent and red present in the members of one subfamily only; but there are occasionally brilliant metallic reflections.

As regards distribution the Honeyeaters are most abundant in Australia, whence they range over the New Zealand, Austro Malayan, and Polynesian regions, a single species crossing the narrow strait (Wallace's line) between Lombock and Bali.

Honeyeaters. —The *Meliphagidæ* are divided into two subfamilies, in the first of which (*Myzomelinæ*) the members are of small size and have a very long, slender, and much curved bill, the colors of the plumage being mainly black and red with sometimes white or yellow below; the sexes are usually very unlike. The Blood Honeyeater (*Myzomela sanguinolenta*) of East Australia is a handsome, lively little species, frequenting the thick brush of both the coasts and the interior, where it gleans its food of insects and pollen from the fragrant blossoms of various trees. It constructs a neat little cup-shaped nest of shreds of bark, which is suspended in a bush or small tree; the two or three eggs are pearly white blotched with chestnut and gray. Less than five inches long, the male has the head, neck, breast, and back shining scarlet, the wings and tail black, and the lower parts buff, while the female is a uniform light brown. Quite different in appearance, but perhaps equally handsome, is the Black Honeyeater (*M. nigra*) of Australia in general, but more especially the interior. About the same size as the other, the male has the entire plumage dull black, except the breast and abdomen, which are pure white, the female being blackish brown above and dingy white below, the throat and neck being mottled with blackish. This species has a quick zigzag flight, and the male is often seen perched on some dead branch, from which he pours forth a feeble, plaintive note. The frail cup-shaped nest is similar to that of its relative, but the eggs, usually two in number, are yellowish buff in color.

Australian Spine-bills. —The only other genus in the subfamily comprises a couple of Australian species known as Spine-bills (*Acanthorhynchus*) from their very long, sharp-pointed, and greatly decurved bill. The Common Spine-bill (*A. tenuirostris*) has a rich though not gay plumage, being reddish brown above, passing through olive-gray to bluish gray on the rump, the quills and six central tail-feathers being black, while the crown is black with a greenish gloss, the ear-coverts and a crescent on the sides of the neck and chest bronzy black, and the cheeks and fore neck white, with a patch of dark brown in the center of the throat, the remainder of the lower parts being reddish fawn-color; the length is just under six inches. It is a rather shy little bird, unless approached when busily engaged in feeding, and frequents flowering gardens as well as the dense beds of *Epacris* and wild flowering shrubs and trees, darting hither and thither, or now and again hovering like a Hummingbird before the bell-shaped blossoms of the *Abutilon*, from the innermost recesses of which it extracts both honey and insects. Its note, according to Gould, is a monotonous shriek, which seems very loud for so small a bird, while Campbell speaks of its single high-pitched note, which it may be heard repeating faster and faster as it flies from flower to flower.

The remainder of the family, comprising the subfamily *Meliphaginæ*, embrace a large number of very interesting birds, but lack of space precludes mention of more than half a dozen.

Stitch-bird. — New Zealand is the home of several species, among them the curious Stitch-bird (*Pogonornis cincta*), which gets its name from certain of its notes which resemble the striking together of two quartz pebbles, the sound having a fanciful resemblance to the word *stc-tch*. It occurs on the North Island only, having become exceedingly rare in late years, and is perhaps on the verge of extinction, frequenting the deep wooded gullies and dense timber along river bottoms, being very shy and active in all its movements, and feeding on insects, the honey of various bush flowers, and the smaller varieties of berries. The sexes are so different in appearance that they are often regarded as belonging to distinct species, the male having the head and neck all around and the chest velvety black, while from the sides of the head just behind the eye spring small erectile tufts of white feathers; a narrow band across the chest and the lesser wing-coverts are bright yellow, the remainder of the lower parts being pale yellowish brown with darker centers to the feathers; the female is dull brownish olive, becoming paler below, and has a white wing-band; the length of both is seven inches. The male bird, says Buller, "erects the tail and spreads the ear-tufts when excited or alarmed, but the female habitually carries the tail perfectly erect. The male utters at short intervals and with startling energy a melodious whistling call of three notes."

Parson-bird; Tui. — Also inhabiting New Zealand as well as the Australian islands is a remarkable species called the Parson-bird, or Tui (*Prosthemadera novæ-zealandiæ*), which is among the largest members of the family, attaining a length of twelve and a half inches. It is bluish or greenish black with metallic reflections, the hind neck being ornamented with a collar of long, soft filamentous plumes, each with a white shaft-streak, while on the sides of the throat are tufts of long, white curly feathers, which form two large globes. "This noisy fellow," says Mr. Layard, "is forever on the move, either flitting about the trees or soaring in airy circles over the forest. This latter pastime usually comes off in the evening when eight or ten may often be seen flying together over trees, turning, twisting, throwing somersaults, dropping from a height with expanded wings and tail, and performing other antics, till, as if guided by some preconcerted signal, they suddenly dive into the forest and are lost to view." The Tui, being an excellent mimic, is prized by both natives and colonists as a cage bird, and can be taught to articulate sentences of several words each, whistle a few bars from a popular tune, or imitate the barking of a dog. It is, however, of rather delicate constitution and rarely survives more than a year or two of confinement. It builds a rather large nest of twigs mixed with moss and fern hair and lined with soft grasses and feathers; the nest is usually placed in the fork of a bushy shrub only a few feet from the ground, and the

Fig. 220. — Parson-bird, *Prosthemadera novæ-zealandiæ*.

complement of eggs is three or four, these being white, often mottled, blotched, and speckled with brown.

New Zealand Bell-bird. — As nearly every part of the world has a bird whose notes are thought more or less fancifully to resemble the sound of a bell, so New Zealand has a Bell bird (*Anthornis melanura*), which happens to belong to the present family. It is a small bird, about seven inches long, the male being uniform dull yellowish green, with black wings and tail, and the female olive-brown above and dingy fawn-color below, the wings and tail brown. Half a century ago the Bell bird was one of the most abundant and generally distributed birds of these regions, but with the coming of civilization and the extensive destruction of the forests it gradually decreased in numbers until it seemed likely to become extinct, but in later years it has regained its ground to some extent. It frequented the woods as well as the dense bushes along streams, feeding upon insects, honey, and apparently berries. The account of its song we quote from Buller: "Its notes, though simple, are varied and sweetly chimed, and as the bird is of social habits, the morning anthem, in which scores of the sylvan choristers perform together, is a concert of eccentric parts, producing a wild but pleasing melody. I have occasionally heard a solitary Bell-bird pouring forth its liquid notes after the darkness of advancing night had silenced all other denizens of the grove. It ought to be mentioned, moreover, that both sexes sing. When alarmed or excited they utter a strain of notes which I can only compare to the sound produced by a policeman's rattle quickly revolved. This cry, or the bird-catcher's imitation of it, never fails to attract to the spot all the Bell-birds within hearing." The nest of this Bell-bird is usually a rather loose structure of small, dry twigs and fine grasses and deeply lined with feathers; it is placed in the fork of a low tree, and the three or four eggs are white or pinkish white with a zone of reddish brown spots toward the larger end and a few similarly colored spots scattered over the general surface. More or less complete albinos of this species and the two preceding are occasionally seen.

South Australian Bell-bird. — In Queensland, New South Wales, and Victoria the colonists have given the name of Bell-bird to another member of this subfamily, although to distinguish it from the Bell-bird of the inland drier parts of Australia (*Oreoica cristata*) it is sometimes called the Bell Miner, which also separates it at least by name from the Miner next to be mentioned. This Bell-bird (*Manorhina melanophrys*) is about seven or eight inches long, and has the plumage golden green throughout, except the wings and tail, which are dark brown, while the eyes are dark brown, the legs and feet orange-yellow, and a naked space behind the eye orange-red. It is a local and gregarious species, living usually in small companies of from ten to forty, chiefly near water and in dense, swampy areas, where it is observed disporting among the leafy branches, assuming all sorts of positions in its search for insects, or "flying with outspread wings and tail from tree to tree, and giving utterance to a peculiar garrulous note totally different in sound from the faint monotonous tinkle usually uttered, which has been justly compared to the sound of distant sheep-bells, and which

when poured forth by a hundred throats from various parts of the forest has a most singular effect." They build a frail cup-shaped nest of fine twigs, shreds of bark and cocoons, lined with rootlets and downy seeds, attaching it by the rim to horizontal twigs of a bush or small tree; the two or rarely three eggs are flesh-colored, marked and spotted with several shades of brown.

Miner; Soldier-bird. — Closely related to the last, indeed often placed with it, is the Miner (*Myzantha garrula*), or Soldier-bird, of South Australia and Tasmania. It is a large bird for the group, being some ten inches long, and is habited in grayish brown above and gray below, with a crescent of glossy black about the head. It prefers the thickly timbered forests of Eucalypti, which clothe the plains and low hills, where it occurs in companies of from four to ten. Gould states that in disposition "it is restless, inquisitive, bold, and noisy, and frequently performs the most grotesque actions, spreading out the wings and tail, hanging from branches in every possible variety of position, and keeping up all the time an incessant babbling; were this only momentary or for a short time, their droll attitudes and singular note would be rather amusing than otherwise; but when they follow you through the entire forest, leaping and flying from branch to branch, they become rather troublesome and annoying."

Australian Watch-bird. — As an example of a Honeyeater in which facial wattles are a prominent feature, we may mention the Red Watch-bird (*Acanthochæra carunculata*) of the coastal regions of South and West Australia. Between fourteen and fifteen inches in length, it is distinguished by the presence of pendulous blood-red wattles which hang on either side of the head behind the eyes, the plumage being mainly grayish brown or gray, each feather with a white or light shaft stripe. It is an active, generally shy and wary bird, frequenting the shrubs and gum trees and usually observed in pairs flitting from tree to tree or searching industriously for its food of insects, honey, and berries. The males are very pugnacious, often engaging in fierce encounters. The nest, which is placed at various heights above the ground, is an open, flat structure composed of twigs and bark, and lined with softer bark, grasses, wool, and feathers; the two or three eggs are salmon-pink blotched and spotted with rich reddish brown.

Australian Friar-birds. — With the Friar-birds (*Philemon*), of which there are several species, we will close the account of this interesting family. Wearing a coat of grayish brown with darker wings and tail and grayish under parts, it has practically all of the head and neck bare of feathers, whence its vernacular name of Friar-bird, Monk, and Leather-head, while from the fancied resemblance of its notes to certain words it is called by some the Poor Soldier, Pimlico, Four-o'clock, etc. It is a familiar bird in many parts of Queensland, New South Wales, and Victoria, occurring both in the thick brushes near the coast and in the more open forests of the interior, and often observed making its way with powerful, undulating flight over the tops of the trees. "Selecting the topmost dead branch of the most leafy tree whereon to perch and pour forth its garrulous and singular notes, it attracts attention more by its loud and extraordinary call than by its presence." It is an impudent and daring

bird, stealing material for its nest whenever opportunity offers, and during the breeding season becomes fierce and pugnacious, readily attacking Crows, Hawks, and other large birds that venture within its chosen habitat and driving them away to a distance. When wounded it has the power of inflicting severe and deep wounds with its sharp claws and strong bill. Gould found them breeding on the upper Hunter River in such numbers as to be termed almost gregarious, though ordinarily but one nest is found in a place. The nest, a large structure of stringy bark, strings, or ribbons, and lined with grass or wool, is suspended by the rim to the forked branchlets of a drooping limb, at no great height from the ground, and utterly without regard for secrecy. The three to five eggs are a pale salmon-color with minute spots of chestnut or purple.

THE WHITE-EYES

(Family *Zosteropidæ*)

The White-eyes, or Silver-eyes, so called from the presence of a rim of small white feathers surrounding the eyes in most species, comprise but a single [1] genus (*Zosterops*) and over one hundred and forty species, though Finsch has recently divided it into three genera, while *Zosterops* still includes one hundred and thirty-eight of the species. They have usually been placed among the Honeyeaters (*Meliphagidæ*), but, pending a full anatomical examination, it seems best to accord them family rank and to place them near the Sunbirds and Flower-peckers, which they also somewhat resemble. They are all small birds, mostly between four and five inches in length, with a slender, pointed, straight, or slightly curved bill about half the length of the head, the nostrils covered by a large membrane, while the tongue is protractile and bifid, each half usually being cut up into many stiff, horny fibers which form a brush. The wings are rather short, with the first primary so extremely small as to be often difficult of detection, while the tail is short and square. The tarsus is of moderate length and covered with a few scales in front, and the middle and outer toes are partially united. The sexes are alike in plumage and the color pattern is very uniform, being composed principally of olive and yellow, while the under parts are usually whitish washed with brown, gray, and fawn-color.

The White-eyes are spread over most of Africa south of the Sahara, the Indian and Malayan regions, and thence to China and Japan and southward to Australia, Tasmania, and New Zealand. They are active little birds, sometimes seen singly or in pairs, but mostly in large or small flocks, and frequenting gardens, orchards, and shrubbery as well as more open forest, where they search industriously for minute insects, which form their principal food, though they are also fond of sucking the juice of various fruits, whence certain of them are looked upon as pests. One Australian species (*Z. cærulescens*) is so given to

[1] Another genus (*Hypocryptadius*) of small brownish birds from the Philippines has been doubtfully referred here by Hartert.

FIG. 221. — 1. Brown-headed Munia, *Munia brunneiceps*.
2. Intermediate White-eye, *Zosterops intermedia*.
3. Black-fronted White-eye, *Zosterops atrifrons*.

destroying the so-called American blight (an aphid — *Schizoneura lanigera*) that it has won for itself the name of Blight-bird and as such is highly prized, though when it levies tribute on the ripe cherries, grapes, and plums it is, perforce, a pest! It is this same species which, within the last fifty years, has extensively

colonized New Zealand, notwithstanding the 1200 miles of open water which intervene. The call or alarm notes of the White-eyes are described as feeble whistle-like or twittering sounds, often repeated, while during the nesting season, and at other times as well, they have a lively and very pretty song. Their nests are delicate little cup shaped structures composed of vegetable fibers and cob webs and lined with fine grass stems, rootlets, hairs, etc.; the eggs, usually but two or three, are pale blue.

Our illustration shows two species from Celebes (*Z. intermedia* and *Z. atrifrons*) which may be taken as characteristic of the group.

THE SUN-BIRDS

(Family *Nectariniidæ*)

The Sun-birds constitute a fairly well marked family of exclusively Old World birds, occurring mainly within the tropics, where, in a measure, they fill the place taken in the New World by the Hummingbirds, approximating them in size, in the brilliancy and metallic luster of their plumage, and to some extent in habits, since they feed upon minute insects and the nectar of flowers. Indeed in India some of them are called "Hummingbirds," but they do not hover before a flower, except rarely, and then for only an instant, but secure the insects and sweets as they cling to the blossoms. It is perhaps unnecessary to add that they are not even remotely related to the true Hummingbirds, their nearest of kin being the Honeyeaters and Flower-peckers. Slender and graceful in form and active in motion, the Sun-birds have a long, cylindrical, and usually decurved bill, both mandibles of which (except in one genus, *Promerops*) have the terminal third of their edges finely serrated, a character which separates them at once from all other passerine families except the *Dicæidæ*, and from these they are distinguished by the shape of the bill, this in the latter family being short and triangular; all nasal and rictal bristles are wanting. The tongue is long, protractile, and ends in a bifid tube (except in *Promerops*). The wings of moderate size contain ten primaries, though the tenth (outermost) is often minute, while the tail, which contains twelve feathers, varies from square to graduated, in the latter case often with the central pair much prolonged beyond the others. There are never crests, but the males are often ornamented by brilliant pectoral tufts and long, downy feathers on the sides of the back. The sexes are usually very different in plumage, the males showing bright, often metallic, colors, while the females are ordinarily dull; the young resemble the adult females.

The **Sun-birds** are most abundant in the Ethiopian region, and thence by way of Palestine, Persia, and Arabia, each of which supports a species, they spread widely over the Indian and Indo-Malayan regions. They go about singly, in pairs, or occasionally in small parties, and frequent gardens, plantations, and open places as well as forests, especially when shrubs and other large

flowers are blooming. They are strictly arboreal, seeking their food, which consists principally of insects and their larvæ and spiders, among the branches of trees and shrubs, often assuming all the attitudes of Titmice or Creepers

Fig. 222. — Sun-bird, *Cinnyris notata*.

similarly engaged. While some of them have at times a pleasing song, many of their ordinary notes are rather shrill, and when the males engage in combat, as they often do, they utter piercing screams. They are strong and quick on the wing, the flight being accompanied by rapid wing-beats, and when at rest

they have the habit of opening and shutting the wings alternately, thus displaying their beautiful plumage to full advantage. They are past masters in the art of nest building, constructing normally a beautiful little pear shaped or oval nest of grasses, moss, down, and spiders' webs, and lined with softer down, hair, feathers, etc.; it is attached to the end of a branch or the under side of a large leaf, and often has the entrance hole protected by a projecting portico or roof. Writing of the habits and nests of the Malay Yellow breasted Sun-bird (*Cinnyris pectoralis*), as observed in Labuan, Mr. Whitehead says: "It is common in the open places generally, preferring fruit gardens to most other localities. I have seen many nests of this bird, which are generally suspended on an outside branch of some bush or small tree. The nest is often a beautiful structure composed of dead leaves; over the small entrance hole is a roof which projects so as to keep out the wet. At the bottom is generally a long streamer which assists in making the nest look much like a lump of leaf refuse that has become fixed to the branches. Inside, the nest is lined with 'Lalang' grass down, from the seeds of that plant." Of the nest of another species (*C. affinis*) he says: "It is a beautiful cup-shaped affair suspended from the under side of some large leaf. The nest is fastened to the leaf by spiders' web which is sewn through. It is composed of brown, silky substance which is found on the young fronds of ferns, and a good deal of white down from seeds is also used. The outside is covered with small flower and plant stems stuck together with spiders' web." The eggs of the Sun-birds are almost invariably two in number, whitish in color, and always more or less profusely streaked or spotted.

Indian Sun-birds. — Of the five Indian genera, *Chalcostetha*, which includes only the Macklot's Sun-bird (*C. pectoralis*), is known by the rather long and well-graduated tail and the covering membrane of the nostrils being feathered. It is a handsome little species about five and a half inches long, the male being largely metallic green suffused with lilac, though the tail is deep blue, the chin, throat, and breast metallic copper-color surrounded by lilac-purple, and the pectoral tufts bright yellow; the female is largely olive-green above and yellow below. The Yellow-backed Sun-birds (*Æthopyga*) have slender, much-decurved bills, the males with elongated central tail-feathers and a yellow back or rump, while the females are more or less completely dull green. Among the twenty or more species of this genus, all of which are remarkable for their brilliancy, it is difficult to select the most notable, yet almost at random we may take the Fire-tailed Yellow-backed Sun-bird (*Æ. ignicauda*). In the male, which is eight inches long, the forehead, crown, and throat are metallic purple and blue, the sides of the head and neck, back, shoulders, upper tail-coverts, and central pair of tail-feathers are rich crimson; the remaining tail-feathers and wings are brown, the former edged with crimson and the latter with olive-green; the rump yellow; the breast bright yellow strongly washed with crimson in the middle, while the remaining under parts are greenish yellow. The female, which is only five inches long, is mainly green. Passing over the genera *Arachnechthra*, in which the tail in both sexes is short and rounded and the bill much curved downward, and *Anthreptes*, which has a deeper, nearly straight bill, we

come to the final Indian genus, the members of which are known as **Spider-hunters** (*Arachnothera*). They are not so brilliant as many of the others, the plumage being more or less green and alike in the two sexes. They are found in the dense evergreen forests and thick plantain gardens in retired spots, and subsist largely on spiders. The nest is often attached to the leaves of the plantain, being in the Streaked Spider-hunter (*A. magna*) an open cup-shaped affair of felted vegetable fibers, dead leaves, etc., and lined with grass and attached by half its rim to the leaf by means of numerous threads.

African Malachite Sun-bird.—One of the best-known African species is the Malachite Sun-bird (*Nectarinia famosa*), which fairly abounds in nearly all South Africa. The male is a shining malachite-green, with blackish wings and tail and brilliant yellow pectoral tufts; the two central tail-feathers are three inches longer than the rest; the female is brownish green above and greenish yellow below. In Natal, Ayres found this species in "open country, feeding upon the nectar of the various kinds of aloes abounding in some localities, and also on that of some species of lilies." According to Captain Shelley, "it is very combative, and if two males meet about the same bush, a fight is sure to ensue, to the great detriment of their beautiful tail-feathers." Another characteristic and often brilliant African genus is *Cinnyris*, and from it has been selected for illustration the Madagascar Sun-bird (*C. notata*).

Promerops. — Although there is still some doubt as to the propriety of including the genus *Promerops* within the limits of this family, it may as well be briefly mentioned here. The two species of the genus are characterized by a slender, slightly curved bill which is almost double the length of the head, an extremely long tail, and scale-covered tarsi; both are confined to South Africa. The best-known species (*P. cafer*), called the Cape Long-tailed Sun-bird, has the upper parts a uniform dark brown, the throat and cheeks white, fore neck and chest rufous-brown, and the breast and abdomen dull whitish with broad, dusky brown central streaks to the feathers; the length is about nineteen and a half inches, of which the tail takes up some twelve or fourteen inches. It is generally found in small parties, the members of which, though acting in concert, still retain their individuality. They follow one another to favorite bushes, chase each other, or feed amicably side by side, and if one flies off the rest follow. It is fond of perching on the summit of high bushes, especially Proteaceæ, from the flowers of which it extracts its food, consisting of insects and honey. It builds a cup-shaped nest of rootlets, grasses, etc., and lays Bunting-like eggs.

THE FLOWER-PECKERS

(Family *Dicæidæ*)

The Indian and Australian regions and the low islands to the eastward are the headquarters of a small but highly interesting group of tiny, often brilliantly plumaged, birds known as Flower-peckers, which are distinguished at once from all other families of passerine birds, except the Sun-birds (*Nectariniidæ*),

Fig 223. — Flower-peckers: 1–2. *Dicæum celebicum;* 3. *D. sangirense;* 4. *D. nehrkorni.*

by having the terminal third of both mandibles finely and evenly serrated, and from these they may be separated by the shape of the bill, this being short and triangular in the Flower-peckers and long and cylindrical in the Sun-birds. These birds are so small — mainly between three and four inches in length — that the serrations on the bill can usually only be detected with a lens, but so far as known they are always present. They have moderately short wings, some genera possessing nine and others ten primaries, and rather short tails of

twelve feathers; the tarsus is also rather short. In the more brilliantly colored members of the group the sexes are very different; but in others, especially the duller plumaged, they are alike, while the young resemble the adult female.

The Flower-peckers are active little birds, usually going in small parties and frequenting woods and gardens, where they mostly keep to the higher branches, along which they flit or from which they often hang like a Titmouse. Their food consists of insects, small spiders, buds, fruits, and small berries, an Australian species (*Dicæum hirundinaceum*), for example, feeding so extensively on the berries of the mistletoe that it is known locally as the Mistletoe-bird. Their call notes are often rather high pitched, but many of them possess a long, low, twittering warble. Their nesting habits are quite diverse, some of them constructing exquisitely wrought little pear-shaped nests suspended from a branch, while others deposit their eggs in holes in banks, hollow logs, or natural cavities in trees. They all appear to lay white eggs.

Typical Flower-peckers. — Among the host of species in the typical genus (*Dicæum*) a few may be selected to show not only the brilliancy of the plumage, but the range in colors. Thus in the Scarlet-backed Flower-pecker (*D. cruentatum*), which ranges from India, southern China, and Siam, through the Malay Peninsula to Sumatra, the male has the entire upper plumage a rich crimson, the sides of the head, neck, wings, and tail black and the lower parts pale buff; the female has only the rump and upper tail-coverts crimson, the remaining upper parts being olive-green, becoming golden yellow on the nape, while the lower parts are ashy buff. The delicate egg-shaped nest of this species is made of vegetable down and grass and attached to the tip of a branch, usually at a considerable height from the ground. Occurring in nearly the same regions and equally brilliant is the Orange-bellied Flower-pecker (*D. trigonostigma*), the male of which is dull blue above, with the back and rump flaming orange-yellow, the throat and breast ashy gray, and the under parts flaming orange; the female is olive-green above, with the rump and upper tail-coverts yellow, the chin, throat, and breast ashy green, and the remaining under parts bright yellow. Its habits are like those already described.

The **Diamond-birds** (*Pardalotus*), of which there are about a dozen species, are confined to Australia and are chiefly remarkable for their habits of nidification, which, as already hinted, differ so widely from those of certain of the other Flower-peckers. One of the most widely distributed and best-known species is the Spotted Diamond-bird (*P. punctatus*) of Australia generally. It is an engaging little species, found in gardens and enclosures as well as in the open forest, searching incessantly for insects among the foliage, not only of the highest trees but of the lower shrubs as well, and is, according to Gould, exceedingly quick in its actions, clinging and moving about in every variety of position both above and beneath the leaves. The nest is usually placed in an underground chamber which is excavated by the birds themselves, though sometimes in a hollow log or accidental opening. The tunnel, which is slightly ascending, runs in from one to three feet and is enlarged at the end to accommodate the nest itself, which is a neat and beautifully built structure composed of soft strips and

shreds of the inner bark of the eucalyptus, and lined with finer strips of the same or sometimes with grass and feathers. The nest is spherical in shape, outwardly about four or five inches in diameter by some two and a half inches inside, with a small hole in the side for an entrance. The four or five eggs are fine-grained, pure white, and slightly glossy. The male in this species, to quote from Gould, "has the crown of the head, wings, and tail black, each feather with a round spot of white near the tip; a stripe of white commences on the nostrils and passes over the eye; ear coverts and sides of the neck gray; feathers of the back gray at base, succeeded by a triangular-shaped spot of fawn-color edged with black; rump rufous-brown and upper tail-coverts crimson"; under parts mostly yellow.

According to Campbell the most beautiful of all is the Yellow-rumped Diamond-bird (*P. xanthopygius*), which inhabits the drier and almost waterless tracts of southern interior and western Australia, placing its nest in a "mouse-like hole, drilled into the flat, hard surface of the ground in an oblique direction for about two feet. At the termination is a cavity thickly walled with interwoven strings of soft bark. The nest is perfectly round, with the side entrance opposite and leading directly into the little tunnel." The eggs are usually four in number.

THE CREEPERS

(Family *Certhiidæ*)

Although the word *creeper* has not of itself a very definite meaning, it has come by common consent to be quite generally applied to the present small group of birds which are characteristically "creepers," normally spending the greater portion of their lives in creeping up and about the trunks of trees and over rocks. The Nuthatches (*Sittidæ*), which are also "creepers," have by many students been placed with them, and some, as Mr. Hume, would make them include the Wrens (*Troglodytidæ*) as well, but they are more properly and conveniently considered distinct. They are small, mainly insectivorous birds, and, with one notable exception, have the plumage very plain, the coloration mostly brown and much streaked or spotted. From the Nuthatches they differ in having the slender bill curved downward, while the wings and tail are variable in size and structure, and the sexes usually alike in plumage. The structure of the feet is much the same as in Nuthatches, the claws, especially that of the hind toe, being very long, much curved, and very sharp to adapt them to their mode of life.

Typical Creepers. — The Creepers are rather sharply divided into two groups, — the true or Tree Creepers, comprising a single genus (*Certhia*) and some thirty odd forms having the tail long, graduated, and the feathers stiff and pointed at the tips, while in the other members of the family the tail is short, rounded, and the feathers soft. In the genus *Certhia* the plumage is soft and loose, the color being brownish, streaked, and spotted above, and plain whitish, grayish,

or buffy beneath, the stiff tail-feathers being employed as in the Woodpeckers as a prop, keeping the bird pressed closely against the tree-trunk, with which its streaked plumage perfectly harmonizes. The best-known species is the Tree Creeper (*C. familiaris*), which is quite widely distributed in both Old and New Worlds, though modified into a large number of more or less distinct geographical races in the different parts of its habitat. The typical form occurs in southern and central Europe, whence it extends to northern Germany and Scandinavia, a slight insular race (*C. f. britannica*) occupying the British Islands, another (*C. f. scandulaca*) eastern Europe and Siberia, and still others Kashmir (*C. f. hodgsoni*) and Japan (*C. f. japonica*); while in North America there are six or seven more. As the habits of all the forms are practically identical, the Brown Creeper (*C. f. americana*) of eastern North America may be selected for more extended mention. It is a quiet, unobtrusive, but busy and restless bird, usually noted during the colder parts of the year, "nimbly creeping up the trunks of trees, ascending in more or less of a spiral, and when the first limbs are reached, flying to the foot of another tree and repeating the performance." Its food consists almost entirely of minute insects, which it seeks incessantly in the cracks and crevices of the bark. Its notes consist of a soft, *cheeping* call note, and during the nesting season of a very sweet, clear song which Mr. Brewster says somewhat resembles that of the Carolina Titmouse (*Parus carolinensis*), but is "infinitely purer and sweeter, a wild, clear voice that one feels would lose its peculiar charm if exposed to cheerful light and commonplace surroundings." It breeds mostly from the northern border of the United States northward, where amid the cool, coniferous forests it finds a congenial home. The nest is usually placed behind loose plates of semi-detached bark, on the trunk of a tree at no great height from the ground, and is so situated that the overhanging bark forms a shelter from the rain, the nest proper being constructed of the fine inner bark of trees, moss, etc., and sometimes lined with feathers. The eggs, five to eight in number, are white, spotted with reddish brown.

FIG. 224. — American Brown Creeper, *Certhia familiaris americana.*

Wall Creeper. — The most striking member of the family is the Wall Creeper (*Tichodroma muraria*) of the alpine regions of central and southern Europe, Asia, and northeastern Africa. The sole tenant of its genus, it is about seven inches in length, has a very long, slender, and nearly straight bill, and very large but rounded wings. The plumage is slate-gray, darker on the head and rump and white on the throat and upper breast, while the wing-quills are blackish tipped with white and the wing-coverts almost entirely crimson; in summer

the throat and breast change to deep black. The Wall Creeper is a wild, shy bird, frequenting the face of rocks and precipices, usually at considerable altitudes during the summer, but descending into the valleys in the winter. It flits and creeps actively about the rocks, seeking its food of insects and spiders, and has a habit of constantly expanding its beautiful wings. Its call note resembles that of certain Woodpeckers, but its most characteristic song consists of several short, melodious notes frequently repeated. It breeds in the crevices of rocks, building a nest of moss, grass, hair, wool, etc., wherein it deposits three or four white eggs which are finely dotted with reddish.

Brown Tree Creepers. — Widely distributed throughout Australia and extending into northwestern New Guinea is *Climacteris*, a genus of large grayish olive or brown Tree Creepers, with a bill only slightly longer than the head and the claws shorter than the hind toe; they are also marked by the presence of a fawn-colored band across the wings. Of the habits of the Brown Tree Creeper (*C. scandens*), Mr. Gould says: "It gives a decided preference to the open, thinly timbered forests of eucalypti, the bark of which, being rough and uneven, affords numerous retreats for various tribes of insects; its food, however, is not only sought for upon the boles and branches of the trees, but is obtained by penetrating the decayed and hollow parts; and it even dives into the small hollow spouts of the branches in search of spiders and other insects; although its form would lead to a contrary supposition, it spends much of its time on the ground, under the canopy and near the boles of the larger trees, in a similar pursuit, and also traverses the fallen trunks with a keen and scrutinizing eye. While on the ground it has a pert, lively action, passing over the surface in a succession of quick shuffling hops, carrying the head erect, with the feathers puffed out, almost in the form of a crest. It flies with a skimming motion of the wings, during which the brown marking of the wing is very conspicuous, and it has a sharp, piercing cry, which is frequently uttered, especially if the tree upon which it is climbing be approached." The nest is placed deep down in a hollow branch and composed of hair, usually that of the opossum; the eggs are two or three in number. Three Philippine species have been separated as the genus *Rhabdornis*, largely on the ground that there is no light-colored band across the wings.

THE HONEY CREEPERS

(Family *Cærebidæ*)

The Honey Creepers, or Guit-Guits, as they are sometimes called, are small, typical, nine-primaried oscinine birds, with slender, acute or slightly hooked bills, and a deeply incised (bifid or trifid) tongue which is fringed or bushy at the tip, the latter, as will be shown, an adaptation to their mode of life. They have wings of moderate length though rather pointed, and the second, third, and fourth primaries usually nearly equal and largest. The tail is much shorter than the wing and variously shaped.

Although the family is usually placed between the Tanagers and Wood Warblers, Mr. F. A. Lucas, who has examined the internal structure of several of the more typical forms, states that they differ *in toto* from the Tanagers and are quite markedly different from the Wood Warblers, apparently finding their nearest relatives among the Honeyeaters (*Meliphagidæ*) of Australasia. As the anatomy and other internal structure are still unknown in more than half the genera, it is evident, as Mr. Ridgway points out, that the determination of the limits of the family, as well as its affinities, must remain for future study.

The Honey Creepers are peculiar to the New World, being most abundantly developed in the forest-clad basin of the Amazon and adjacent parts of Ecuador and Colombia, extending also throughout the West Indies, where almost every island has its peculiar form. A few species reach northward into Mexico, and a single one has been found as a rare straggler on the Florida Keys. According to Mr. Ridgway, who has recently revised the group, they number about eleven genera and some seventy-five species, a larger number than has usually been considered as belonging here. They are all small birds, few exceeding five inches in length, and often brightly colored with a mixed plumage of bright blue, green and yellow, although some are more or less plain olive, gray, or even black. They are active birds, often going about in flocks and feeding on minute insects and probably nectar, which they extract from the bright-hued tropical flowers, not after the manner of Hummingbirds, but by clinging in all sorts of positions to the twigs and branches or even the flowers themselves. Some may feed on ripe fruit, as Richmond reports the Green Honey Creeper (*Chlorophanes spiza*) as feeding on ripe bananas in Nicaragua, while another species was attracted by the cocoanut and bread-fruit trees, their bills always being covered with a waxy substance which exudes from these fruits.

The nests of the Honey Creepers are in general well-made structures, being built of small twigs and lined with fine rootlets and grass stems. When placed in the open, that is in bushes and trees, the nests are usually more or less dome-shaped, that of the Porto Rican Banana-quit (*Cœreba portoricensis*) being about six inches high and nearly five inches in greater outside diameter. Of the habits of the St. Vincent Banana-quit, or Sucrier (*C. saccharina*), as it is called locally, the late Mr. J. G. Wells writes as follows: "This pretty little bird is numerous in Carriacou, and may be seen wherever there are blossoms, it being very fond of the insects found in the petals; it is also partial to the fruit of the prickly pear. It nests both in trees and in houses, the nests built outside being dome-shaped; those outside are generally built to suit a space between two beams or flat on the sill. The Church at Hillsborough is a favorite nesting place of this bird. I have seen a pair busily engaged building a nest on a chandelier in the church whilst divine service was being held and over 500 persons were in the building. A pair built a nest and reared their young in a tethering chain hung up for sale in one of the shops. The eggs are three in number, of a dull white thickly spotted with brown." Other and more brilliant members of the family belong to the genera *Cyanerpes*, *Dacnis*, etc., in which there is much rich blue, violet-blue, and yellow.

THE HAWAIIAN HONEY CREEPERS

(Family *Drepanididæ*)

This little group, which includes only about forty forms, is entirely confined to the Hawaiian Islands, where it is of great importance, since it comprises fully two thirds of the species of typical Hawaiian birds. They were formerly placed with the Honeyeaters (*Meliphagidæ*), and later scattered among the Flowerpeckers (*Dicæidæ*), both of which groups they somewhat resemble, but largely on the basis of extensive anatomical material, Dr. Gadow has recently decided that the family is probably of American origin and most closely related to the Honey Creepers (*Cœrebidæ*). They undoubtedly reached the islands a very long time ago, probably being the first avian inhabitants other than sea birds, since they have had sufficient time to become differentiated into very diverse forms. They are small or medium-sized oscinine birds, with moderately long, pointed wings, rather short, nearly square tails, and a moderately long tarsus. The bill is extremely variable, in some (*Vestiaria* and *Drepanis*) being long and much curved, the upper mandible being nearly twice the length of the lower. In a majority of forms the bill is shorter and but little decurved, becoming stout, hooked, and decidedly Finch-like in *Loxioides*, *Rhodacanthis*, etc., and reaches its extreme development in *Pseudonestor*, where it becomes actually Parrot-like. In one genus (*Loxops*) the lower mandible is slightly twisted, either to the right or to the left, a character individually acquired, it was presumed, by their "twisting open husks and seeds, or cracks of bark in search of their food," but Henshaw states that they secure their prey, which consists of small insects and caterpillars, among the leaves, the small outermost twigs, and the flowers of the koa, and never, so far as he could learn, probe into the cracks and crevices of the bark nor "twist off husks and seeds"; its origin and function, if there be one, is therefore unknown. The nostrils in the members of this group are sometimes covered by an operculum, but no bristles are ever present. The tongue is normally semi-tubular and frayed out into a brush-like tip, but in the thicker billed forms it is only slightly tubular and more or less split or frayed above.

The *Drepanididæ* are birds apparently of weak constitution, a condition induced, perhaps, by continuous inbreeding, since they seem unable or indisposed to surmount seemingly slight barriers to their spread, and insignificant changes in their surroundings result disastrously. Some of them are distributed throughout several of the islands and are fairly abundant, and some are found on two adjacent islands, while others are so extremely rare that they are confined to areas but a few square miles in extent, and seem on the point of extinction. They are preëminently birds of the forests and seem wholly unable to avail themselves of any of the advantages which often accrue to small birds with the spread of civilization, — in fact, the cutting away of the fringe to the forest has displaced some, and with the gradual removal of the forests themselves their habitats are becoming more and more contracted, and unless this deforestation

be checked, most of them must be pushed to the wall. Another cause tending to their decrease has been their destruction at the hands of the natives. A few of them possess bright feathers which were formerly used in decorating cloaks, arm- and head-bands, etc., and as each bird bore but a very small number, it was necessary to sacrifice a great many. The ruling class among the natives exacted a "feather tax," and so difficult was it to procure them even then that it sometimes occupied several generations in securing a sufficient number to manufacture a single garment. These cloaks were looked upon as of almost priceless value, and among the ethnological collections of the U. S. National Museum is such an one, said to be valued at one million dollars. Originally the birds were caught by snaring or "liming," and although the catchers were expressly enjoined to pluck out the bright feathers and liberate the bird otherwise uninjured, it is improbable that this was usually done; with the advent of firearms the destruction was made certain and complete. Almost all of them had distinctive native names, given in imitation of their notes.

As these birds inhabit the all but impenetrable forests, it is extremely difficult to observe them, with the result that little is known of their general habits and practically nothing of their nidification. Some feed on insects which they seek among the branches and leaves, among the flower clusters, or in the crevices of the bark; some feed largely on nectar and others almost entirely on berries and fruits.

Akioloa. — In the genus *Hemignathus*, already mentioned as the one in which the much-curved upper mandible is nearly twice the length of the lower one, the best-known species is the Akioloa (*H. obscurus*), a bird six and a half inches long, bright olive-green above and dull olive-green below, with a stripe above the eye of gamboge-yellow and the lores black. This rare bird, once common to several islands, is now confined to the island of Hawaii, where it inhabits the deep forests. It has stout legs and sharp claws and it runs rapidly over the larger limbs and seeks its food of grubs, beetles, and their larvæ among the dense tangles of ferns and mosses. Of the three other species in the genus one rests on a single specimen, another is believed to be extinct, and the other is extremely rare.

Amakihi. — One of the commonest and most widely distributed of the island species is the Hawaii an Amakihi (*Chlorodrepanis virens*), which is oil-green above and greenish yellow below; its length is four and a half inches. It is very fond of nectar, especially of the imported nasturtium and banana, but it also feeds on minute insects, which it searches for almost entirely on the leaves. It has a low but sweet trilled song and builds a cup-shaped nest of roots and bark, lined with rootlets. Another genus furnishing a number of common Creeper-like birds is *Oreomystis*. Thus the Kakawahie, or literally "fire-wood" (*O. flammea*), is a beautiful species, being nearly pure scarlet throughout.

Mamo. — The most celebrated member of the group was the Mamo (*Drepanis pacifica*), since its feathers were more highly prized than those of any other, being "dedicated solely to the services of the higher chiefs." The general color is a glossy black, with the exception of the rump, upper and under tail-

coverts, lower part of the body, tibia, and front margin of the wing, which are a fine crocus yellow; the length is about eight inches. The Mamo was probably never very abundant, and according to Mr. Henshaw there is every reason to believe that it is now extinct, the last ones having been seen alive in 1898 and 1899. Continuing, Mr. Henshaw says: "We know next to nothing of the habits of the Mamo. The birds I saw on Kanmana were very active and evidently were in pursuit of insects which they were hunting on the very tops of the tall ohias. The birds' flight from tree to tree was not rapid, but was smooth and well sustained, and the bird on the wing reminded me of nothing so much as a Cuckoo. Though I observed the birds at intervals for more than two hours, I did not hear a single note."

Fig. 225. - Mamo, *Drepanis pacifica*.

Akepeuie. — The smallest and at the same time the most beautiful and highly colored members of the group belong to the genus *Loxops*, which has already been noted as that in which the lower mandible is slightly twisted either to the right or left. In the best-known species, known to the natives as the Akepeuie (*L. coccinea*), the male has the upper plumage scarlet-orange and the lower parts cadmium-orange, while the female is olive-green above and gamboge-yellow beneath; the length is four and a half inches.

THE WOOD WARBLERS

(Family *Mniotiltidæ*)

This family is exclusively American, taking the place in the New World filled by the true Warblers and Flycatchers of the Old World. They number about thirty genera and two hundred species, and are all small oscinine or so-called singing birds, with nine primaries, slender or flat bills, rather pointed wings, and rounded tails. They differ from the Honey Creepers in having the tongue but slightly if at all bifid or fimbriate, and from the Wagtails and Pipits in the absence of the elongated hind claw. Of their general characteristics and appearance Ridgway says: "The Wood Warblers are essentially — most of them strictly — insectivorous birds, of active habits. Most of them are arboreal, nesting and feeding among trees and rarely descending to the ground; some are terrestrial, living much upon or near the ground, where they walk in the graceful, 'mincing' manner of a Wagtail or Pipit, meanwhile tilting the body as if upon a pivot and oscillating the tail in the same characteristic manner. Most of them are expert 'flycatchers.' Others creep about the trunks and branches of trees as nimbly as a Nuthatch. The majority of them combine, in various degrees, these several habits. As a rule they are birds of beautiful plumage, though

their attractiveness in this respect consists in the tasteful arrangement or 'pattern' of the colors rather than their brilliancy. Yellow is the most common and characteristic hue, though this is usually relieved by markings or areas of black, gray, olive-green, or white, usually by two or more of these colors; red is not infrequent, grayish blue less common, while pure blue, green, or purple are never present, and the plumage never glossy as it is in many Honey Creepers and Tanagers."

The Wood Warblers are found throughout North and Middle and South America and constitute one of the most attractive elements of our bird life, although never a very conspicuous factor, owing to their retiring disposition and quiet ways. A large proportion of the genera are monotypic, that is, each is represented by a single known species, although often separated into local or geographic forms. Some are of wide distribution, spreading, for example, over the whole of eastern North America, while others are confined to single small islands in the West Indies. With a few exceptions the seventy or more species found in the United States are highly migratory birds, passing rapidly through in late spring to their summer homes, mainly beyond our northern borders to the Hudson Bay region, Labrador, or even Alaska, returning to spend the winter months in the Southern States, Mexico, Central and South America, or the West Indies. A notable exception, however, is furnished by the Yellow-rumped or Myrtle Warbler (*Dendroica coronata*), which has been known to spend the winter as far north as Maine, Massachusetts, and central Ohio, where it feeds on the berries of the myrtle or bearberry.

"Musical proficiency might be reasonably presupposed in a group of birds known by the delightfully suggestive name of 'Warblers,'" says Coues, "yet they are not songsters of the first class, the most familiar notes by which they are known during the migrations being weak, lisping *tseeps*." In their summer homes, however, some of them display considerable vocal power, the Myrtle Warbler, for example, being described by Dall as a "melodious and sprightly singer," in its home along the Yukon, and the Mexican Thrush-Warbler is said to be "one of the sweetest songsters of western Mexico." The voice of the Oven-bird and the Water Thrushes (*Seiurus*) is delightfully clear and ringing as it comes to us from the woodland shades.

The nests of the Wood Warblers are usually good examples of bird architecture. They are placed in forking branches, often of low bushes only a few feet from the ground, though some species invariably build high up among the branches of coniferous trees, while in the more terrestrial species the nest may be placed in a dense tussock of grass on the ground, and at least one species — the Prothonotary Warbler — selects a hole in a stump or tree. The nests are usually deeply cup-shaped, composed of fine twigs, strips of bark, grasses, or pine needles, and lined with fine root-like fibers, plant down, etc. The Oven-bird (*Seiurus aurocapillus*), however, constructs on the ground a bulky covered nest of coarse grasses, leaves, rootlets, etc., which has an opening on one side. The eggs of the Warblers are usually four or five in number, whitish, generally with brownish dots about the larger end.

Black-and-white Warbler. -The first species to be mentioned, the Black-and-white Warbler, or Black-and-white Creeper (*Mniotilta varia*), as it is oftener called, would hardly be recognized at first as a Warbler, as it climbs with tireless activity about the trunks and larger limbs of our woodland trees, for it much more resembles one of the true Creepers. About five and a half inches long, it has the upper parts streaked with black and white, the ear coverts black, the throat and upper breast black or black and white, while the sides are streaked with black and white and middle of the abdomen white. It is a rather silent bird, spending the nesting season from the Southern States to the Mackenzie Valley and the winter from Florida southward. The nest, composed of strips of bark, grasses, etc., is placed on the ground at the base of a tree or rock.

Prothonotary Warbler. — Passing over a number of obscure forms that make their home on or near the ground in dense tangled underbrush, mention may be made of the handsome monotypic Prothonotary Warbler (*Protonotaria citrea*) of the eastern United States as far north as southern Illinois and Virginia. It has the head, neck, and under parts rich yellow or orange, becoming lighter below, while the wings and tail are ashy, the latter with white inner webs to all but the inner pair of feathers. The Prothonotary makes its home among the willow thickets along streams or about ponds, and is the species above mentioned as placing its nest in a hole in a stump or tree, usually selecting one in or hanging over the water.

Parula Warbler. — The genus *Compsothlypis* embraces three species and a number of geographic forms, the best-known species being the little Parula Warbler (*C. americana*), which breeds from the Gulf States to Virginia and occasionally farther, and winters mainly in Florida. Under five inches in length, it has the upper parts dull grayish blue, the middle of the back greenish yellow, and the throat and breast yellow with a band of blackish across the breast. On its return from its winter home it is restless and active, frequenting usually the tops of the highest trees, where it may often be seen in the creeping and preying postures of a Titmouse, as it flits about among the blossoms and opening foliage. Its nest is generally placed in a swinging bunch of beard-moss (*Usnea*), at a height of from ten to forty feet from the ground, and is composed of threads of the "moss," fine grass, etc., and often lined with hair. A northern race (*C. a. usneæ*) carries it from Virginia to New Brunswick and Ontario, and a western race (*C. a. ramalinæ*) takes it into the Mississippi Valley.

Dendroica. — This brings us to *Dendroica*, the largest and most-varied genus of the family, which comprises some of the best-known as well as the handsomest of the Warblers. They are small or medium-sized arboreal or subarboreal birds, with a slender conoidal bill, obvious rictal bristles, and partly white or yellow inner webs to the lateral tail-feathers. Of these one of the most familiar is the Yellow or Summer Warbler (*D. æstiva*), which is very abundant about houses and shrubbery throughout most of the Eastern States. It has the upper parts bright greenish yellow, lighter on the crown, the wings edged with yellow, the tail

fuscous with the inner vanes yellow, and the whole under parts bright yellow streaked with rufous. Although belonging to the same genus the Black-throated Blue Warbler (*D. cærulescens*) is in striking contrast to the last, being grayish blue above, with the sides of the head and throat jet-black and the remainder of the under parts pure white; there is also a conspicuous white wing-patch. Another handsome species is the Magnolia or Black-and-yellow Warbler (*D. maculosa*), which has the back black, bordered with olive-green, the rump yellow, the tail black, and the lower parts yellow, with the breast and sides heavily streaked with black. But perhaps handsomest of all is the Blackburnian Warbler (*D. blackburniæ*), which has the back black streaked with whitish, the center of the crown black, a line over the eye, a patch behind the ear, and the throat and breast a beautiful rich orange. It has been said of this charming species that "he seems like some bright-plumaged tropical bird who has lost his way and wandered to northern climes." The Myrtle or Yellow-rumped Warbler (*D. coronata*), already mentioned as a hardier species than most of the other members of the genus, has the upper parts bluish gray streaked with black, a yellow patch on the crown, rump, and either side of the breast, the throat white and the breast and upper part of the abdomen heavily marked with black. This species is a native of eastern North America, breeding from northern Minnesota and northern New England northward, while in western North America its place is taken by the closely related Audubon's Warbler (*D. auduboni*), which has the throat yellow instead of white.

Oven-bird.—Among the next few species to demand our attention are some of the sweetest singers of the entire family, such, for instance, as the Oven-bird (*Seiurus aurocapillus*), which is a common summer resident from Kansas and Virginia northward to Manitoba and Labrador. A little over six inches in length, it has the upper parts, including wings and tail, a brownish olive-green, with the center of the crown pale rufous or ochraceous buff bordered by black lines on either side, while the under parts are white, with the sides of throat, breast, and sides streaked with black. The Oven-bird, or Golden-crowned Thrush, as it is often called, is a shy and retiring bird, even where fairly abundant, and but for his exuberant, albeit somewhat simple not to say monotonous, song, would be rarely observed. The song Mr. Burroughs renders as teacher, *teacher*, TEACHER, TEACHER, **TEACHER**, that is, rising from low to high in a long, reiterated note or chant. The Oven-bird prefers woodland where there is plenty of undergrowth and spends much time on the ground or in the lower branches, only rarely seeking the higher tree-tops. The arched or domed nest is placed on the ground at the base of a tree or on a mossy log, and is rather loosely made of twigs, grass, leaves, and moss, and lined with tendrils and fine rootlets; the four or five eggs are white or buffy, with numerous brownish markings especially about the larger end.

Water Thrushes.—A much better singer is the Louisiana Water Thrush (*S. motacilla*) of the eastern United States as far as Minnesota and Connecticut, and its near relative, the Water Thrush (*S. noveboracensis*), which spends the nesting season from northern Illinois and northern New England northward.

About six inches long, the first has the upper parts, wings, and tail olive, with a conspicuous white line over the eye, and the under parts white tinged with buff and streaked with black except on throat and middle abdomen, while the latter is similar, but has a buffy line over the eye and the under parts white tinged with sulphur-yellow and somewhere streaked with black. The Water Thrushes, as their name implies, prefer the dense tangles along streams and watercourses, and are shy and resentful of intrusion, but, says Chapman, speaking of the first-mentioned species, as a "songster he is without a rival. His song is not to be compared with the clear-voiced carol of the Rose-breasted Grosbeak, the plaintive chant of the Field Sparrow, or the hymn-like melody of the true Thrushes; it is of a different kind. It is the untamable spirit of the bird rendered in music. There is an almost fierce wildness in its ringing notes."

Yellow-throats. — Another interesting group of small, terrestrial Warblers are the Yellow-throats (*Geothlypis*), of which there are upward of twenty forms widely spread over temperate North America, continental tropical America, and the West Indies. In coloration they are olive greenish above, and beneath, at least partly, sometimes wholly, yellow, the adult males with the forehead and a portion of the sides of the head black. The best-known species is the Maryland Yellow-throat (*G. trichas*) of the Atlantic coast district of the United States, breeding in Virginia, Maryland, and the upland portions of the Carolinas and Georgia. It frequents the bushes and tangles along streams and swamps, and is constantly on the move, giving voice to its continually repeated song of *wichity, wichity, wichity wichity*. It builds a bulky nest on or near the ground, generally in a dense tussock of grass, and lays from three to five white, thinly spotted eggs. Slightly larger and with the lower parts more extensively yellow is the otherwise similar Northern Yellow-throat (*G. t. brachidactyla*), which ranges over the Northeastern States, while the similar but slightly darker and longer-tailed Southern Yellow-throat (*G. t. ignota*) occurs in southern Atlantic and Gulf coast districts. The Western Yellow-throat (*G. t. occidentalis*) finds its home over the whole of the arid region of the western United States, the Pacific Yellow-throat (*G. t. arizela*) on the Pacific coast from British Columbia southward, and the Salt Marsh Yellow-throat (*G. t. sinuosa*) occurs only in the salt marshes about San Francisco Bay, California.

Yellow-breasted Chat. — The largest North American member of the family is the monotypic Yellow-breasted Chat (*Icteria virens*), which is a common summer visitor throughout the eastern United States. Nearly seven and a half inches in length, it is plain olive-green or olive-grayish above, with a white line from the bill to the eye, a white eye-ring, and a similar white band along the sides of the throat, while the lores are black, the throat, breast, and upper belly bright yellow, and lower belly white. The Yellow-breasted Chat frequents bushy tangles or thickets in partial clearings and is a rather shy, nervous bird, though with due caution in approaching one may catch glimpses of him as he makes short flights from one bush to another. He has a great variety of notes, — whistles, *chucks*, and querulous *chŭts*, — but he is erratic in both song and action. The nest is a rather bulky

affair of coarse grasses, leaves, and bark, and is placed in a crotch near the ground; the eggs are from three to five in number, white, speckled and spotted with rufous-brown. In the Western States from the eastern border of the Great Plains to the Pacific coast occurs the Long-tailed Chat (*I. v. longicauda*), which differs in having the wing, tail, and bill longer than in the typical form.

Redstarts.—We have space to mention but a few more of the many engaging members of the family, among them the Redstarts (*Setophaga*), which may be described as small, "flycatching" *Mniotiltidæ*, with a short, depressed bill, strong rictal bristles, and a plumage varied with black, red, or orange and white. The American Redstart (*S. ruticilla*) has the head, neck, chest, and upper parts uniform shining black, the sides of the breast and flanks as well as the basal half of the wing-feathers reddish salmon, and the belly white, while the constantly spread tail has the basal two thirds of all but the middle pair of feathers pale orange or salmon-pink. It is a restless, active, arboreal species, affecting woodlands and open, timbered swamps, where it flits from limb to limb, now and again making quick sallies out to catch passing insects, spreading and flirting its handsome tail and keeping up a constant but rather weak, though varied, song.

Red Warbler.—Also belonging to this "flycatching" group is the handsome little Red Warbler (*Ergaticus ruber*), the subject of our colored plate. It is a native of the highlands of Mexico, and but little is known of its life history, its habits of nidification, for instance, being unknown.

THE TANAGERS

(Family *Tanagridæ*)

The Tanagers are most closely related to the Finches, so closely, in fact, that it is almost impossible to draw any sharp or satisfactory line between them, and until the anatomical structure, now almost unknown, is worked out for the great variety of forms, the limits of both groups must be regarded as more or less artificial. As at present understood the Tanagers may be defined as small, fruit-eating or insect-eating, nine-primaried, singing birds (*Oscines*), with a more or less cone-shaped bill in which the commissure is not distinctly angulated or deflexed at base, nor is the cutting edge of the mandible ever angulated or toothed back of the middle, though often toothed at or beyond this point.

The Tanagers are exclusively American, having their center of distribution in the dense forest-clad region of Central and South America between the tropics and east of the Andes, whence they fall off rapidly in numbers either way, only about fifteen species extending southward to Argentina, and only six forms, and these of a single genus, reaching as far north as the United States. About four hundred species are known, distributed among sixty or more genera. They are compactly built birds, few of them exceeding ten inches in length and the majority of them being only about six inches long. They are chiefly remarkable

RED WARBLER
(*Ergaticus ruber*)

for their gorgeous coloration, vying in this respect even with the Hummingbirds and Parrots. "But," as Stejneger well says, "while thus highly attractive on account of their coloration, they offer none of these extraordinary ornaments consisting of marvelously formed tufts, elongation of tail or wing feathers, oddly curved beaks, etc. Nor is there anything characteristic, novel, or wonderful in their habits, so far as we know them. Their skill as nest builders is not extraordinary, nor are any of them particularly prominent as songsters." But brilliant and beautiful in plumage many of them certainly are.

Scarlet and Summer Tanagers. Of the species reaching the United States the Scarlet Tanager (*Piranga erythromelas*) is the best known, being a rather common summer visitor throughout the eastern states. The male is bright, intense scarlet, the wings and tail black, and the under wing coverts white, while the female is plain yellowish olive-green above and light yellow below. The other species of eastern North America is the Summer Tanager (*P. rubra*), the male of which is rosy vermilion-red, brighter below and with the wings hair-brown edged with dull red. The female is yellowish olive-green above and dull orange-yellow below. These species frequent rather open woodlands and have a clear, pleasing, though rather monotonous, song. The slight saucer-shaped nest is placed on a horizontal limb, usually from seven to twenty feet from the ground, and is composed of dried weed stalks, grasses, strips of bark, etc. The eggs are three or four in number, greenish blue speckled with brown.

Louisiana Tanager. — Throughout the western United States, from the eastern base of the Rocky Mountains to the Pacific, and northward to British Columbia the Louisiana or Scarlet-headed Tanager (*P. ludoviciana*) is frequently met with. The male has the back, wings, and tail black, the wings with two broad yellow bands, the rump, upper part of the tail, and lower parts of gamboge-yellow, while the head and neck are orange or red. The female is olive-greenish above and dull yellowish below. She has also the two distinct wing-bars. This species makes its home along streams, about lakes and ponds, and especially along the borders of coniferous forests.

Other North American Tanagers. — The other forms entering the United States are the Cooper's Tanager (*P. rubra cooperi*), a larger southwestern race of the Summer Tanager, and the Hepatic Tanager (*P. hepatica*), a bird of the Mexican plateau which ranges into Arizona and New Mexico. It is a little larger than the Scarlet Tanager, and is dull grayish red above and light vermilion below.

Velvet Tanagers. — In continental tropical America, from southern Mexico to Brazil and Peru, Tanagers of the genus *Ramphocelus* form a large and conspicuous group. They are medium-sized birds, the adult males being richly colored with black and scarlet, black and maroon, black, crimson, and scarlet, or black and yellow. The plumage is soft and velvety, that of the forehead being stiff, erect, and plush-like. Passerini's Tanager (*R. passerinii*) is said by Richmond to be exceedingly abundant in eastern Nicaragua. In color the male is uniform glossy black, except the lower back, rump, and upper tail-coverts,

which are bright, intense scarlet. Richmond says: "It fairly swarms in all favorable situations, and is one of the first birds to impress the eye of a foreigner. The birds spend the day romping about in the bushes or in the banana plantations, chasing one another here and there, with no apparent reason other than to pass away the time. They keep up an almost continual squeaky chatter, which is the only note heard on ordinary occasions, but at times I have heard solitary males sing, if the performance may be called a song. It is a very inferior chant, much like the ordinary chatter, but uttered in a slow and measured way. Females appear to be much more numerous than males. The birds are perhaps not truly gregarious, although very social the year round, and may possibly be polygamous. The birds show little feeling when robbed of nests and eggs. The nests are placed in bushes or vines, from one to five feet from the ground, constructed of small stems of plants and dead leaves and lined with fine grass stems. The eggs are ovate, pale blue, marked chiefly on the larger end with dark brown, almost black, spots." The number of eggs appears to be always two.

Crimson-collared Tanager. — Similar in general to the members of the last genus is the beautiful monotypic Crimson-collared Tanager (*Phlogothraupis sanguinolenta*) of Central America, differing, however, in having the sexes alike in color. The adult plumage is deep black with a blood-red collar which extends over the top of the head to the center of the forehead. It frequents banana plantations and thickets of bamboo along streams, and has habits of nesting similar to those of the Passerini's Tanager.

Euphonias. — The Euphonias form another large tropical group of some thirty or more species. They are small, short-tailed, fruit-eating Tanagers of quite a different style of coloration from those before mentioned, being usually black above glossed with violet, steel-blue, or green, and usually with more or less blue, yellow, or brown on the head. The lower parts are mainly yellow. They feed on the fruit of the cactus, banana, etc.

White-capped Tanager. — We have space for but a few other members of this brilliant assemblage, — such as the Cardinal, Imperial, or White-capped Tanager (*Stephanophorus leucocephalus*), which ranges from southern Brazil to Paraguay and northern Argentina. This bird is a uniform deep blue, with a silky white cap and a small bright crimson crest. The female is similar but less bright. "A more beautiful bird than this Tanager it would be difficult to find," says Barrows, "at least on the Uruguay, and when, in one of those narrow passages between the islands where the trees lean toward each other and solid walls of green rise on either side of your boat, you see a pair of these blue beauties swaying on a slender bush and showing at each turn of the head the snowy crown with its little dash of garnet, while the whole picture lies mirrored in the quiet water. Although shy and suspicious the birds are really plenty enough, and after you learn where to look for them, you may find them in pairs any day in the year. The male during the breeding season has a strong, sweet warble recalling that of the Pine Grosbeak, but at other times both sexes are very silent, giving only a faint, quick chirp of alarm as they disappear."

CENTRAL AMERICAN TANAGER
(*Chlorochrysa nitidissima*)

Parrot-Tanager. — A curious rather than beautiful member of the group is the Parrot Tanager (*Psittospiza riefferi*) of the Andes of Colombia and Ecuador. The subject of our colored illustration is the splendid Central American Tanager (*Chlorochrysa nitidissima*) of the United States of Colombia. It is rather rare and little is known of its habits.

THE WEAVER-BIRDS

(Family *Ploceidæ*)

To the casual observer the members of the present family are very likely to be mistaken for Finches (*Fringillidæ*), for they have the stocky bodies and in general the conical, thick, and heavy bills characteristic of Sparrows or Finches, and as a matter of fact about the only visible difference between them is the possession of ten instead of nine primaries, and even this first primary in many is so minute as to be observed with difficulty. In fact, there is a complex of four so-called families — the Troupials (*Icteridæ*), Tanagers (*Tanagridæ*), Weaver-birds (*Ploceidæ*), and Finches (*Fringillidæ*) — which interdigitate at so many points and in general are so closely related that it is hard to decide whether it would be best to "regard them all as members of one family," or make an entirely new disposition. Be this as it may, we may leave its settlement to future investigators and pass to a brief consideration of the *Ploceidæ* as usually accepted. They are exclusively confined to the Old World, having their center of distribution in Africa, whence they range over the Oriental and Australian regions, but none reaches New Zealand nor enters the Palæarctic region. In a way they take the place in the Eastern Hemisphere that is occupied in the New World by the Troupials or Hang-nests, and like the latter many of them construct pensile nests. The family is divided into two groups or subfamilies largely on the basis of the length of the outermost primary, this in the true or typical Weaver-birds (*Ploceinæ*) being about as long as the tarsus. In addition to this character it may be mentioned that the males of these birds have a distinct summer and winter plumage, the spring moult being partial and confined to those parts in which there is a change of color. In the other subfamily (*Viduinæ*), which includes the so-called Munias, Widow-birds, Wax-bills, etc., the outermost primary is very minute, being much shorter than the tarsus, and there is no spring moult; they should probably be given full family rank.

The first subfamily, with the exception of two Asiatic genera and some half a dozen species, is confined to Africa, and its members are mainly gregarious, usually breeding in company and at other seasons of the year associating in large flocks. They are for the most part sedentary in their habits, usually tame and fearless of man and frequenting a great variety of situations such as woods and gardens, open fields and grassy plains, as well as reed beds along streams, rice-fields, and bushy jungle. They feed for the most part on grain and seeds with occasional insects, and while they have no song worthy of the name, they keep

up a constant chattering and chirping which in chorus sounds fairly attractive. Many of them make attractive cage birds and are frequently kept in confinement.

Olive-and-yellow Weaver-bird. — As an example of a large, exclusively African genus in which the nostrils are oval and practically covered by the plumes at the base of the bill and a horny membrane, and the plumage shows much of bright yellow, we may select the Olive-and-yellow Weaver-bird (*Hyphantornis olivaceus*) of the more southern districts of South Africa. It is a fairly common species in many localities, being usually observed in flocks of from ten to fifteen individuals, and Mr. Ayres reports them as being exceedingly fond of sucking the nectar from the plumes of the cape-broom, a thorny tree which bears a bright scarlet blossom before the leaves appear; they also feed to some extent on insects. They place their nests indiscriminately over the driest spots or over water, sometimes attaching them to trees and at other times to reeds, in the latter case being woven to two or more of the stems. The nests are composed of the leaves of the reeds torn into strips, in shape being like a retort with the neck cut off, the opening downward, and there is a sort of bar across the entrance which prevents the eggs from rolling out. The nests are warmly lined with the soft flowering heads of grass, and the eggs, two or three in number, are a beautiful green without spots. This species is easily distinguished by its large size, the length being about seven inches, and by the absence of black on the head and throat, the main color being yellow, washed with greenish yellow on back of the neck and shoulders. An inch less in length and having the forehead, sides of the head, and throat black is the Black-fronted Weaver-bird (*H. velatus*), also of South Africa. In Natal, Mr. Ayres states, "these birds are gregarious and are troublesome to all cereal crops as they live almost entirely upon grain and grass seeds. They build their nests invariably amongst reeds which grow in swamps and shallow water. Whilst building they have a curious habit of hanging by their feet from their nests, and, with wings extended, drooping and fluttering, they sway themselves slowly from side to side; this has a very pretty effect when a number of nests are close together and all in about the same stage of building."

Red-billed Weaver-bird. — Distinguished at once by their much larger size and nearly uniform black plumage are the several species of the genus *Textor*, all of which are confined to Africa. One of the best-known is the Red-billed Weaver-bird (*T. niger*), which has the stout bill orange-red or coral-red and the legs salmon-color. Regarding this species, Mr. Andersson writes as follows: "This large Finch-like bird is rather common in Damara Land and also in the Lake regions, and is a noisy species, gregarious in its habits, breeding in colonies, and constructing many nests in the same tree. These collective nests consist externally of an immense mass of dry twigs and sticks, in which are to be found from four to six separate nests or holes of oval form, composed of dry grass only, but united to each other by intricate masses of sticks, defying the ingress of any intruder except a small snake. In each of these separate holes are laid three or four eggs, exactly resembling Sparrows' eggs, but much larger." This species feeds upon seeds, berries, and insects.

Asiatic Weaver-bird. — Of the two Asiatic genera belonging to this subfamily the larger (*Ploceus*) is known by having the thick bill longer than it is high, while the tail is short and rounded, the tarsus strong, and the claws of considerable length. In the spring the males assume a yellow crown, the plumage at other seasons resembling that of the female, being largely fulvous streaked with

Fig. 226. — Baya Weaver-bird, *Ploceus baya*.

brownish black. The several species construct neat flask-shaped nests with a tubular entrance and lay white eggs. The Baya or Common Weaver-bird (*P. baya*) is a familiar bird throughout Ceylon and the whole of India, suspending its handsome purse-shaped nest, which is twelve or fourteen inches long, from thorny branches or the tips of palm leaves. Of their manner of constructing the nest, Phillips says: "The nest is generally commenced from the top, the birds forming a circle like a hoop, on which they sit and swing while working; the top of the hoop is gradually widened, so as at last to form a dome with two

supports; and thus the work goes on, till the whole dome has come to the length of the bottom of the hoop; then the nest begins to be formed into two compartments; on one side of the hoop the nest itself is placed, the other side being formed into an entrance. They form the nest of one kind of dry grass, and during its formation you may observe them walking over the outside of the nest, prying about in every direction, and here and there tightening a fiber by seizing it with their beak and moving their head to and fro."

The **Golden Weaver-bird** (*Ploceella javensis*), the only representative of the other genus, has the bill no longer than it is high, while the breeding plumage of the male is largely yellow, at other times being largely rufous-brown streaked with dark brown. The nesting habits differ from those of the others in that they build a much rougher cylindrical nest and usually attach it to several stems or reeds; the two or three eggs are of all colors, — greenish, gray, purplish, etc., — but rarely pure white.

Widow-birds. — We come now to the second subfamily (*Viduinæ*), which embraces the most brilliant as well as some of the most interesting members of the entire group, among them the Whydah or Widow-birds, in which the males have the four central tail-feathers very greatly elongated. In the common Widow-bird (*Vidua principalis*) of Central and South Africa, these central feathers, which are assumed only during the breeding season, are neither wire-shafted nor widened at the ends, the general color of the plumage in the males being glossy black, with the rump, a large shoulder patch, and the entire under parts pure white; at other seasons they resemble the females, which are mottled brown and black above and whitish below; the total length of the males is ten inches, of which the tail is seven and three tenths inches, and of the female about four and seven tenths inches. This rather rare species is usually seen in pairs and, according to Mr. Ayres, during the breeding season when the wonderful tail of the male is fully developed, he will sometimes rise until nearly out of sight, when he suddenly descends with much velocity.

Passing over the Shaft-tailed Widow-bird (*Tetrænura regia*), which is separated generically on the ground that the four central tail-feathers are attenuated and shaft-like for their entire length, and the Paradise Widow-bird (*Steganura paradisea*) of East and Central Africa, in which the central feathers of the tail are laterally flattened and end in hair-like points, mention should be made of the Long-tailed Widow-bird (*Chera procne*) of South Africa. The male in nuptial dress is entirely glossy black, with a shoulder patch of scarlet, the total length being twenty inches, of which the tail takes up quite fifteen inches; the female is sandy buff, the center of each feather being darker. The "Kafir Fink," as it is called by the colonists, is a bird of very weak though graceful flight, frequenting swampy ground and long reeds about ponds. Mr. Barratt states that after a sharp shower of rain or in a strong wind it is barely able to fly, and can easily be knocked down, and Dr. Sharpe says that the Kafir children stretch bird-limed lines across a field, as of millet and Kafir corn, and snare great numbers by their tails becoming entangled in the lines. It builds its rather rough nest, according to Bowker, in long grass close to the ground, and the points

of the grasses are drawn over and tied together at the top like the framework of a native hut; the eggs are almost invariably four in number. The females greatly exceed the males in number, the proportion being often ten or fifteen to one.

Bishop-birds. — With the tail shorter than the wings and nearly square, and the feathering of the body soft and velvety, and the neck frilled, are the brilliantly colored Bishop-birds (*Pyromelana*), also of Africa. One of the handsomest is the little Red Bishop-bird (*P. oryx*), the male of which in breeding dress is brilliant scarlet above and velvety black below, while the female and male in non-breeding plumage are brown, each feather with a dark stripe; the length is five inches. It is a sociable species, congregating in immense flocks both in winter and summer, but during the latter season the flocks appear to consist almost entirely of males in their gaudy red and black plumage. It also breeds in large companies, in reedy pools and swamps, suspending its nest of fine grasses from reeds and flags. During the winter season the flocks do much damage to grain-fields if they happen to be near their nesting place, but otherwise they do not stray far. Slightly larger and of wholly different appearance is the Black-and yellow Bishop-bird (*P. capensis*) of South Africa, the full-plumaged male of which is deep velvety black, with the rump and shoulders brilliant yellow; the female and male in winter dress are light brown, each feather dark-striped. Its habits are similar to those of the other species; it feeds largely on the seeds of grass.

Sociable Weaver-birds. — With the widely known Sociable Weaver-birds (*Philetærus*) we may close our account of the African members of this group. They are small birds, about five inches long, with no frill such as that found in the Bishop-birds, a very small first primary, a short, thick bill, and plain, largely brownish plumage. The best-known of the four or five species, and the Sociable Weaver-bird *par excellence*, is *P. socius* of the interior of South Africa. Gregarious and sociable at all seasons, they are especially remarkable for the manner in which they combine their energies in the construction of a common domicile. An acacia with a straight smooth stem or an exceedingly thorny tree, such as predatory animals cannot easily climb, is usually selected by the bird community. When the site is chosen, the birds begin by constructing a roof, which, Mr. Andersson says, often comprises whole cart-loads of grass piled on a branch in one enormous mass of an irregular umbrella shape, looking like a miniature haystack, and almost solid, but with the under surface — which is nearly flat — honeycombed all over with little cavities, which serve not only as places for incubation, but also as a refuge against rain and wind. There is no connection between the chambers and each is lined warmly with feathers. Their eggs are three or four in number, of a drab color, closely speckled with minute spots of purple-gray.

Munias; Java Sparrow. — The extra-African forms of this subfamily, known as Munias, are referable to some half a dozen genera, and in general possess a powerful swollen bill, and a tail in which the central pair of feathers are often produced and more or less pointed; there is no spring change of plumage. The

Munias, Mr. Oates says, associate in large flocks during the winter months, but they separate and are no longer sociable in the breeding season, although several nests may often be found near together. They construct large round nests of grass with an opening at the side, placing them in bushes or clumps of grass, and some species build about houses. The eggs are numerous, being frequently six or more, and are invariably pure white. The Munias feed on the ground or else cling to the heads of the flowering grasses or cereals and consume immense quantities of grain. One of the typical members is the Java Sparrow (*Munia oryzivora*), Rice-bird, or Paddy-bird, a native of Java, Sumatra, and Malacca, but now introduced into many other countries, and also widely known as a cage bird, especially the pure white, pink-billed form which has been developed under domestication. These birds in a wild state are exceedingly destructive to rice and are looked upon as great pests. The species shown in our plate is the Brown-headed Munia (*M. brunneiceps*) of Borneo and Celebes, a handsome little bird a little under four inches in length, in which the prevailing color above is light rufous or chestnut, with head, neck, and throat sooty black or dusky chocolate, and the under parts chestnut and black.

THE TROUPIALS

(Family *Icteridæ*)

The birds of this family are more widely known as the American Orioles, American Starlings, or Hang-nests, but I gladly follow Mr. Ridgway's suggestion of Troupial as a common name, since but few of them have much more than a superficial resemblance to the Old World Orioles or Starlings, and only a small proportion of them build pensile nests. They are small or medium-sized birds, with nine primaries and a more or less conical acute bill, in which the culmen is usually somewhat elevated at the base, or sometimes expanded or swollen into a conspicuous "casque" or "frontal shield." Their nearest relatives appear to be the Finches, the only external character separating them being the absence of bristles about the mouth.

Bobolink. — The group is exclusively American and a majority of the nearly one hundred and fifty species are of tropical distribution. There are some eight genera and about thirty forms found within the limits of the United States, among them being some of our commonest and best-known birds. The Bobolink (*Dolichonyx oryzivorus*), so dear to the hearts of the people of New England, is too well known to need description. They enter the Southern States the last of March or the first of April, and by the middle of May have reached their summer homes in the meadows of the New England States. After rearing their young the males lose their bright dress and exuberant song and appear in the plain striped plumage of the females and young. Their only note now is a musical *chink*, and in July they begin the return journey, congregating in vast flocks to feed upon the wild rice of Maryland and Virginia, where they are known as

the Reed bird. Soon they pass on to become the dreaded Rice bird of the south, often causing immense damage in the cultivated rice-fields; but by the end of October they have departed, some by way of Cuba, others by way of Central America, to their winter residence in southern and southwestern Brazil.

FIG. 227. — Bobolink, *Dolichonyx oryzivorus*.

The **Meadow-larks** (*Sturnella*), of which three species and three or four forms are known, are also familiar birds over much of the United States as well as parts of Mexico and Cuba. They are terrestrial birds, about ten inches long, with a short tail, long legs and toes, and a long, slender bill. The plumage is brownish above, much streaked and barred with blackish, while the lower parts are yellow, which in the mature birds is set off by a black crescent on the chest. They generally frequent meadows, fields, and prairies, though the Florida form is not only partial to, but makes its nest in, open pine woods. They feed on insects and their larvæ, especially grasshoppers and cutworms, and only to a limited extent on seeds. Their nests, placed on the ground in a tussock of grass, are often partially arched over, and contain from three to seven, but usually about five, white eggs which are more or less profusely speckled with brown. The Eastern Meadow-lark or Field-Lark (*S. magna*) — and indeed the other forms as well — is a social bird, usually found in small flocks, their cheery call, likened to the words *you-can't-see-me*, being frequently given. The Western Meadow-lark (*S. neglecta*), which is a smaller and lighter-colored bird, has a totally different call. The two species just mentioned are migratory, spending the winter in the Southern States and Mexico, although they sometimes linger until the cold weather actually begins. I shot a fine male on December 9, 1882, in western Vermont, when the ground was covered with snow to a depth of three inches. On dissection the crop was found to contain a mass of insects, mostly beetles.

FIG. 228. — Meadow-lark, *Sturnella magna*.

Blackbirds. — Quite closely related to these are the Blackbirds, of which the common Red-wing (*Agelaius phœniceus*) may be taken as a good example. It is about nine and a half inches long, the plumage in the male being deep black with the exception of a buff-bordered bright scarlet patch on the shoulders, while the female is blackish, streaked with rusty, buff, and whitish. It is common over eastern North America, breeding from the Gulf of Mexico to Canada, and wintering from Virginia southward. They are very social birds, coming and going in flocks often of thousands, and building their nests in close proximity among the cat-tails and reeds of our marshes. "Mounting the topmost branch of a tree not far from the nest, the male becomes an ever vigilant sentinel. His rich '*kong-quer-ree*,' which by association is so strongly suggestive of reedy marshes, is a signal that 'all's well.' He challenges all suspicious characters by an inquiring *chut*, *chuck*, and with a long, shrill alarm-note *chee-e-e-e-e*, circles out on fluttering wings, his gorgeous crimson epaulets showing conspicuously." — CHAPMAN. The nest, which is attached to reeds or low bushes, is a deep, substantial affair of coarse grasses and stalks and lined with finer grasses and rootlets. The eggs are from three to five in number, pale bluish, curiously marked with dots and irregular scrawls of dark purple or black, mainly at the larger end. More or less well marked subspecies of the Red-wing are found in Florida, the Bahamas, Vera Cruz, and various areas in the western parts of North America. Other species are the Tawny-shouldered Red-wing (*A. humilis*) of Cuba, which has the shoulder patch cinnamon-rufous, and the Yellow-shouldered Red-wing (*A. xanthomus*) of Porto Rico, which has clear lemon-yellow shoulder spots. Another closely allied and striking bird is the Yellow-headed Blackbird (*Xanthocephalus xanthocephalus*) of western and central temperate North America, the male of which is black, with the head, neck, and breast yellow or orange.

Grackles, or Crow Blackbirds. — It is a common sight in the eastern United States to see a dozen or twenty deep black birds that are not unlike miniature Crows, walking about in parks, lawns, and fields. These are the Grackles, or Crow Blackbirds (*Quiscalus*), as they are often called. A nearer approach shows that they have very long, graduated tails which are folded, when in flight, so that a transverse section is V-shaped, and the black plumage is resolved into metallic green, blue, violet, and bronze reflections. They are social birds, coming often in great flocks in the earliest spring, and soon breaking up into smaller parties engage in the duties of rearing the young. At this period they are exceedingly destructive to the eggs and especially the young of small birds, often despoiling every nest within a considerable area. The nests are bulky affairs of coarse grass, sedges, weed stalks, and roots often cemented with mud. They are usually placed in trees, sometimes several in the same tree, occasionally in bushes or in holes in trees. They lay from four to seven, usually about five, eggs, which are generally bluish or bluish green, spotted, blotched, or scrawled with brown or black. Three forms are known, — the Purple Grackle (*Q. quiscula*), which nests from the lower Mississippi Valley and Georgia to Massachusetts; the Florida Grackle (*Q. q. aglæus*), found from central Georgia to Mississippi and southward to Key West; and the Bronze Grackle (*Q. q. æneus*), of the area

between the eastern base of the Rocky Mountains and Labrador except the lower Atlantic coast. Closely allied to these are the Grackles of the West Indies and northern South America (*Holoquiscalus*), but differing in having the tail decidedly shorter than the wing, and the Boat tails (*Megaquiscalus*) of the South Atlantic and Gulf States, Mexico, and Central America, in which the tail is as long as, or longer than, the wing. Their habits are much like those of the other Grackles described.

Cow-birds. — The maternal instinct is supposed to be one of the most strongly developed of bird traits, and so, indeed, it is in most cases, the exception in the New World being afforded by the Cow-birds, small semi terrestrial birds of this family, with a short, conical bill, long, pointed wings, and plain or uniform coloration. Of the dozen or more species known, which range over temperate and tropical America, all, with possibly one exception, impose the duties of rearing their young upon other, usually smaller, birds. Of the American Cow-bird (*Molothrus ater*) Chapman says: "English sparrows, either because they are not aware of the customs of New World bird life, or because of a possible and not unlikely affinity, associate with him; but no self-respecting American bird will be found in his company," and he adds: "I can imagine no sight more strongly suggestive of a thoroughly despicable nature than a female Cow-bird sneaking through the trees or bushes in search of a victim upon whom to shift the duties of motherhood." These Cow-birds go about at all seasons of the year in flocks of varying size, frequenting pastures and open woodland, being often seen about cattle, presumably attracted by the insects stirred up by the herd. When the female feels called upon to deposit an egg, she silently leaves the flock, and, skulking through hedgerow and field, finds a nest from which the owners are absent and quickly laying her egg rejoins her companions, who make no apparent comment upon either absence or return. Major Bendire gives a list of over ninety species which are victimized by the Cow-bird, the birds most frequently selected being the Phœbe, Song Sparrow, Towhee, Indigo Bunting, Oven-bird, and Yellow-breasted Chat. Some birds resent their intrusion by abandoning their nest or building another over it, but most of them appear to submit to it as a necessary evil. But the affair does not end here, for the Cow-bird's egg, being usually larger than those of the owners of the nest, receives more heat from the body of the incubating bird, and hatches before the other, usually in ten or eleven days, and the youngster takes up so much room and receives so much more nourishment that it not infrequently happens that the other young ones are crowded out or are starved to death. Bendire, quoting from a Mr. White, gives an interesting account of the placing of a Cow-bird's egg in a nest of a Chipping Sparrow, which already contained two of her own eggs. The Cow-bird hatched a day before the first and only Sparrow, as the second Sparrow's egg failed to hatch. "The daily increase in the size of the Cow-bird," he says, "was something immense, while his younger companion seemed to diminish rather than enlarge, until finally, at the end of three days, he died, evidently for the want of food, as the Cow-bird, being larger, greedily devoured everything that came in contact with his capacious mouth." At the end of three

weeks the Cow-bird was full grown and had left his foster parents to join the increasing flocks of his kind. It is not an uncommon sight to see a Warbler or small Sparrow feeding a young Cow-bird larger than itself, and Mr. Hudson speaks of seeing the young Argentine Cow-bird being fed by the Reed Tyrant, a little Flycatcher hardly half the size of the Cow-bird. The little thing flew directly to its large foster offspring, and, alighting on its back, dropped a worm into the upturned mouth, a performance he saw repeated many times.

Argentine Cow-birds. — Of the three species of Cow-bird found in Argentina, Mr. Hudson has given us a very full and interesting account. The Bay-winged Cow-bird (*M. badius*) builds a nest for itself, or expels the owners of some other nest, adapting it to its own use, and lays usually five eggs, which are incubated and the young reared in the proper manner. It is apparently never parasitic itself, but, curiously enough, it is the species usually selected as foster parent by the Screaming Cow-bird (*M. rufoaxillaris*), whose eggs so exactly resemble those of the Bay-wing as to be indistinguishable. The young for some time are so similar to those of the Bay-wing that they cannot be distinguished, and it is not until they assume the full first plumage that the species can be differentiated. The completeness of this adaptation is perhaps without a parallel in nature. The remaining species — the Argentine Cow-bird (*M. bonariensis*) — is perfectly parasitic, selecting a number of small birds, but never, apparently, its near relative the Bay-wing. In the eggs of this species there is the most extraordinary diversity in color, form, and disposition of the markings, hardly any two, even those laid by the same bird, being alike. For example, they range in color from pure white to a fine deep red, and the degree of spotting and marking is almost infinite. This may or may not be an adaptation for placing their eggs in nests where they will most closely resemble the eggs of the owners, but it certainly suggests this hypothesis.

The **American Orioles**, or **Hang-nests**, whose generic designation (*Icterus*) gives name to the family, form a very large group of more than fifty species and subspecies. They are found over the whole of temperate and tropical America, reaching their greatest development within the tropics, and are usually richly colored birds, with sharply contrasted areas of black and orange, black and yellow, or black and chestnut. The females and young are mostly plainer with much of greenish olive. Of the six or eight forms visiting the United States, the Baltimore Oriole (*I. galbula*) is by far the best known and most prized, its coming being eagerly watched for, and fortunate indeed does the householder consider himself when the "Golden Robin," or "Hang-nest," decides to build his wonderful swinging cradle in the elm tree overhanging the home. The male has the head, neck, throat, and upper back black, and the breast, abdomen, lower back, and lesser wing-coverts a deep rich orange or orange-yellow, sometimes becoming intense orange or almost flame-scarlet. The wings are black as are the middle pair of tail-feathers, the others being light orange or orange-yellow. The Baltimore Oriole usually arrives at its summer home early in May, the males generally preceding the females by two or three days. They frequent the open country along shade-bordered roads, creek bottoms,

and orchards, and are especially at home in villages and small cities where there are numerous shade trees. They are much attached to their nesting sites and return year after year to the same tree, and not infrequently to the same nest. The pair show a great affection for each other, and Major Bendire thinks they must mate for life. The nest is usually pensile and attached to slender drooping branches of the elm, maple, birch, weeping willows, and similar trees. It is deeply pouch-shaped and made of vegetable fibers, grapevine bark, twine, yarn, etc., and neatly lined with cotton, fur, hair, mosses, fine grasses, and almost anything that comes handy. The nest is usually so placed as to be shaded by a spray of leaves. The eggs, four to six in number, are grayish white, covered with blotches and irregularly shaped lines and tracings of black or brown. These birds feed almost exclusively on insects, destroying a great variety of larvæ, spiders, caterpillars, etc., and deserve the most careful protection.

Orchard Oriole. Wholly different from this species is the Orchard Oriole (*I. spurius*), also of the eastern United States. It is a smaller bird, the male being mostly uniform black except the rump, upper tail-coverts, lesser and middle wing-coverts, and under parts, which are a uniform rich chestnut. Its center of abundance is perhaps the states bordering the Mississippi Valley, where, as its names implies, it frequents orchards, and although not a shy bird is difficult to observe closely as it flits about the foliage, constantly changing its position in the never ending search for insects. The nest, although usually more or less basket or hammock like, is not infrequently placed in the crotch formed by several small limbs. It is composed of fine, tough, freshly dried grasses closely interwoven and lined with plant down, cotton, etc. They usually lay four or five bluish white eggs, which are marked and scrawled with black or brown.

Some of the other forms are the Arizona Hooded Oriole (*I. cucullatus nelsoni*), a handsome bird of our southwestern borders, Scott's Oriole (*I. parisorum*) of somewhat similar range, and Bullock's Oriole (*I. bullocki*) of western North America from southern British Columbia to the Mexican plateau.

Oropendolas. — It would be interesting, if we had the space, to describe more of these beautiful birds, but it would require a separate volume to adequately portray them, and we can only devote a few final words to the Oropendolas and Caciques. As an example of the former, we may take Wagler's Oropendola (*Zarhynchus wagleri*), a native of southern Mexico and thence southward to Peru. It is a large bird, some ten inches long, and has the plumage of back, with scapulars, wings, middle pair of tail-feathers, breast, abdomen and thighs black, more or less greenish glossy; the tail yellow (except the middle pair of feathers), and the rest of plumage dark chestnut. It is chiefly remarkable, however, for the shape of the bill, this being swollen at base to form a broad, rounded frontal shield. The following account of the habits of this species is taken from Richmond, who met with it in Costa Rica. He says: "A colony was observed nest building on the Rio Frio early in March. The actual work of securing material and constructing the nests seemed to fall upon the females,

the males merely accompanying them back and forth on these occasions. A dead tree standing in the open, containing a hornets' nest, had been selected by the birds, and about fifty nests were suspended from the extremities of the branches. These were nearly finished and various nests on the ground testified to the overburdening of some of the smaller branches. I did not hear any song, but the birds kept up a low chuckling note as they flew to and from the tree." These pendent nests, sometimes over three feet in length, are indeed very conspicuous objects.

The **Caciques** are smaller birds than the last, with a plumage of mixed black and scarlet, orange-red, or yellow, or in some plain black. They are without the frontal shield of the Oropendolas, but some of them have the head conspicuously crested. The Mexican Cacique (*Cassiculus melanicterus*) of western Mexico is black and lemon-yellow in color, and builds a wonderful pensile nest sometimes three or four feet in length. These are attached to the slender branches of mimosa, acacia, and other trees, sometimes as many as half a dozen in the same tree, and are moved by the slightest breath of air. They are made of long, coarse, tough grass, narrow strips of palm leaf, and often bits of twine and thread. The eggs are four or five, white and marked like Orioles' eggs.

The Slender-billed Cacique (*Cacicus microrhynchus*) of Central America — a bird in which the uniform deep black is set off by a large triangular patch of flame-scarlet on the rump — is said by Richmond to be gregarious at all times except during the breeding season. They select tall forest trees in which to place the nest.

THE SWALLOW-TANAGERS

(Family *Procniatidæ*)

This unimportant family is represented by a single species, — the so-called Swallow-Tanager (*Procnias tersa*) of the Brazilian and Amazonian provinces and the northeastern portion of the Colombian province. It was formerly associated with the Tanagers, but recent investigation of its anatomical structure has disclosed the fact that it departs widely not only from the Tanagers but from the majority of passerine birds, these differences being sufficient, in the opinion of Lucas and Ridgway, to entitle it to family rank perhaps with closest affinity to the Swallows. It is a small bird, six inches in length, mainly blue in color, with the sides and flanks barred with black. It nests in holes and lays four pure white eggs.

THE PLUSH-CAPPED FINCHES

(Family *Catamblyrhynchidæ*)

If it were not for the necessity of rendering the treatment of the passerine birds complete, it would hardly be worth while to mention the present "family," since it comprises but a single, little-known species, — the so-called Plush-

capped Finch (*Catamblyrhynchus diadema*). This bird has usually been placed with the true Finches (*Fringillidæ*), but it is now separated on the ground that the bill is conspicuously flattened laterally, and the plumage of the forehead and crown is dense, erect, and plush like, neither of these conditions prevailing in the *Fringillidæ*. It is a small bird, only about six inches in length, the general color above being a dark bluish gray, with the crown, nape, lores, and region around the eye black, while the entire under surface is deep chestnut. The Plush-capped Finch is a native of the northern Andes from Colombia to Peru, and beyond the fact that it is often seen in pairs and in the company of other birds nothing appears to have been recorded concerning its habits. Its nest and eggs are unknown.

THE FINCHES AND SPARROWS

(Family *Fringillidæ*)

In most parts of the world, but notably in the Northern Hemisphere, the members of the present group are abundant and well known, being in general plain-plumaged birds of small size, with a strong, hard, cone-shaped bill which is adapted in most cases for shelling and eating the various seeds that form the chief portion of their food when adult. Notwithstanding the ease with which the ordinary or typical members of the group can be allocated, it is beyond question that, as currently accepted, the group is more or less artificial, the line which separates it from the *Tanagridæ* (Tanagers), for instance, being especially unsatisfactory. The Buntings (*Emberizinæ*) afford another example of the difficulty, not to say impossibility, of drawing a delimiting line, some ornithologists according them full family rank, and others placing them directly with the *Fringillidæ*, a disposition here followed. The reasons for much of the uncertainty regarding the affinities of the present and obviously allied groups are due largely to the fact that the anatomical characters of a very large percentage of the forms are entirely unknown, and until these have been worked out, we must remain in ignorance of the true systematic position.

In addition to the above characters it may be mentioned that while the bill is of a general conoid shape it is subject to considerable variation, being in some cases remarkably thick, in others long and more slender, while in the Crossbills it assumes an extreme form, the mandibles being crossed at their tips. The wings, which contain nine primaries, are variable in shape, ranging from long and pointed to short and rounded, as in the genus *Passer*, while the twelve-feathered tail likewise varies, being graduated, rounded, square, or even forked. The nostrils are pierced close to the line of the forehead and very near the upper mandible, and are concealed by feathers or a membrane, while the rictal bristles are obvious and usually distinct, at least among the North American forms. The nestling plumage being variable does not afford as good characters as in many other groups, while in the adults the plumage of the sexes is dissimilar in perhaps a majority of cases. They ordinarily undergo

but one moult in a year, "yet their summer and winter plumages differ considerably in many of the species. In spring and summer the margins of the feathers are lost by abrasion or by being cut off, and then the color of the parts affected becomes more uniform and frequently more brilliant." Generally the colors are quite plain, but there are notable exceptions in which brilliant red, blue, yellow, green, and snowy white appear. The *Fringillidæ* are for the most part gregarious and arboreal, but they descend freely to the ground in search of food, and not a few spend practically their entire lives there, many placing their nests on the ground. For the most part they are hardy birds, some being resident where found, but the majority are migratory to a greater or less extent, often spending the nesting season in the far North and the winter months in the more southern latitudes. Many of them are good singers, and although they ordinarily stand captivity well, they are not, except in a few notable cases, caged to any great extent.

In accordance with the views of perhaps the majority of ornithologists, the *Fringillidæ* are placed at the top of the avian series, though this position is by no means unchallenged. There are also differences of opinion as to the number of groups that can be successfully determined within the family, Dr. Sharpe, for instance, dividing them into several subfamilies; while Mr. Ridgway, in his "Birds of North and Middle America," allows no subfamilies, but recognizes upward of twenty more or less well defined "groups" that fall within the limits of his work. As lack of space will prevent anything like a complete exposition of this vast assemblage, we can only select a few of the more prominent forms, and hope thereby to convey a fairly accurate idea of what they are like.

Evening Grosbeak. — Beginning with the Grosbeaks, Hawfinches, etc., we have a group of rather large, often brightly colored, birds in which the bill is very large and thick, the best-known American representative being the handsome Evening Grosbeak (*Hesperiphona*), which in three slight geographic races spreads over western temperate North America from the British provinces to the highlands of southern Mexico. To quote from the inimitable Coues: "A bird of most distinguished appearance, indeed, is the Evening Grosbeak, whose very name of the 'vesper-voiced' suggests at once the far-away land of the dipping sun, and the tuneful romance which the wild bird throws around the fading light of day. Clothed in the most striking color contrasts of black, white, and gold, he seems to represent the allegory of diurnal transmutations; for his sable pinions close around the brightness of his vesture, just as the night encompasses the golden hues of the sunset; while the clear, white space infolded in these tints foretells the dawn of the morrow." The Evening Grosbeak (*H. vespertinus*) is gregarious, constantly going about in small and occasionally large flocks, and is very tame and unsuspicious, often permitting half a dozen to be shot out of a flock before making much attempt to escape. They frequent especially the coniferous forests, where they feed largely upon the seeds of conifers; but in winter they are considerably given to wandering apparently in search of food, and are then often found feeding on buds of the maple,

as well as its seeds and those of the box elder. They breed in the mountainous portions of their range, constructing in low trees or bushes a flat, shallow nest of sticks and rootlets; the eggs are greenish white, spotted and blotched with brown. They are persistent singers, though the song is not of a high order of merit.

Hawfinches. — Most closely related is the Hawfinch (*Coccothraustes coccothraustes*) of Europe as far north as southern Sweden and Norway, whence in a number of forms it ranges east to Japan. In the British Islands it is rather rare and local, though apparently on the increase, and frequents groves, gardens, and orchards. It is an extremely shy, wary bird, keeping mostly to the tops of the trees, and is generally silent except for a sharp, clicking call note. Its food consists largely of hard-shelled seeds or fruits, though the young are fed on caterpillars. It builds a large, well-made nest in a bush or hedge, and lays from four to six olive or bluish green black-spotted eggs. About seven inches in length, the Hawfinch has the lores, throat, and feathers at the base of the bill black, the crown and cheeks reddish brown, the nape ash-gray, and the back reddish brown, while the wings are black with the great coverts white, and the lower parts light purplish brown or grayish. Hume's Hawfinch (*C. humii*) of the Himalayas differs in being less brightly colored.

Pine Grosbeaks. — Inhabiting the coniferous forests of the Northern Hemisphere are the Pine Grosbeaks (*Pinicola*), which are very large arboreal Finches with long wings and tail and a very short, broad, thick bill. The plumage of the adult males is a dull rose-pink or madder-pink, changing to ash-gray on scapulars, flanks, abdomen, and under tail-coverts, the females being largely grayish without any red, but changing to bright olive-tawny on the head and lower rump. The typical form (*P. enucleator*) is a native of northern Europe and Asia, and is not very sharply differentiated from the North American representatives, which, however, have been divided into some four or five geographic races. The best-known American form is the Canadian Pine Grosbeak (*P. e. leucura*) of northeastern North America, which spends the summer months from northern Maine and New Brunswick north to the limit of coniferous forests, but in winter comes southward somewhat irregularly to southern New England and the middle Western States. Comparatively little is known of it in its summer home beyond the fact that it appears to lead a quiet and retired life in the gloomiest recesses of the coniferous forests; but

Fig. 229. — Canadian Pine Grosbeak, *Pinicola enucleator leucura*.

in winter when it comes southward it frequents parks with evergreens and plantations of mountain-ash trees, where it feeds upon such unfallen berries as can then be found. Coming in small flocks, it is ordinarily very tame and unsuspicious, but soon becomes shy under persecution. It breeds mainly in the high north, placing its lightly constructed nest in a coniferous tree, and in May or June laying three or four eggs, which are greenish blue spotted and splashed with dark brown.

Bullfinches. — Belonging near the last are the so-called Bullfinches (*Pyrrhula*), which are medium-sized or rather small arboreal Finches of short, thick build, very fluffy plumage, and a very short, thick, strikingly arched bill. In color the plumage of the head, wings, and tail is black, the rump and under tail-coverts usually white, while the males of most species have the under parts mostly red. With the exception of a single species (Cassin's Bullfinch *P. cassini*), which occasionally straggles into Alaska, the several members of this genus are mainly confined to the northern and central portions of Europe and Asia, with one extending to the Philippines, the most familiar being the Bullfinch (*P. europæa*) of continental and western Europe. This bird is a resident throughout its range and appears to pair for life, the male and female being seen together at all times. They frequent woods, groves, gardens, and tangled shrubbery along streams, and are ordinarily quite tame when not persecuted, but as they are often held in ill repute by gardeners on account of their destruction of buds of fruit and other trees, they may become exceedingly wary. Their food consists largely of seeds, chiefly those of noxious weeds, berries, etc., as well as tender buds, the young being fed on both insects and seeds. The "call and alarm note is a low, piping, musical sound, very pleasing to hear. The male sings in the spring, and so, it is said, does the female; but his strain is short and so feeble that it can be heard only at a distance of a few yards." It is highly prized as a cage bird, and in certain localities appears to be declining in numbers. The nest is placed in a dense holly, a yew tree, or hedge, and is deeply cup-shaped and often lined with hair or wool; the four or five eggs are greenish blue, spotted and blotched with brown of several shades.

FIG. 230. — Bullfinch, European *Pyrrhula europæa*.

Crossbills. — One of the best-marked of the minor groups of Finches is that comprising the Crossbills (*Loxia*), which, as implied by the name, have the mandibles crossed at the tip, a seeming malformation, but really an admirable adaptation for securing their food of seeds by forcing off the scales from cones

of evergreen trees. Between five and seven inches in length, they are distinctly arboreal birds, possessing many of the actions and characteristics of small Parrots, as they climb about and hang in all sorts of positions, making almost equal use of bill, feet, and wings. In color the adult males are dull red, with the wings and tail black or dusky, the former with or without white bands. The females and immature males have the red replaced by olive-greenish and yellow. These birds frequent mostly the dense coniferous forests, feeding largely on the seeds of the pine, spruce, etc., but also to some extent on insects and their larvæ. The typical or Common Crossbill (*L. curvirostra*) is a native of northern Europe, and is represented by a number of subspecies or closely allied forms south to western Africa, and thence east to Japan and south to the Himalayas and China, being represented in the New World by three fairly well marked geographic races, which combined carry it over the entire Nearctic region except in the warmer parts, and southward to the high mountains of Guatemala. The American Crossbill (*L. c. minor*) so called differs from the typical form merely in its smaller size and darker coloration, and is at home throughout practically the whole of northern and eastern North America. Normally, they prefer the northern evergreen forests, but usually they are very erratic wanderers with the loosest of home ties, and under the apparent impetus of a scant food supply may invade far districts, and, oblivious of such unusual surroundings, may linger indefinitely in the "foreign land," and may even rear their young there. They go about in flocks and ordinarily show but little fear of man. "When feeding they have a short, whistled call note; they take wing in a body, and their undulating flight is accompanied by a sharp clicking or whistling note. The song is described as 'varied and pleasing, but not powerful or in any respect remarkable.'" They nest in coniferous trees, usually at no great height from the ground, constructing a nest of twigs, rootlets, moss, feathers, etc.; they lay three or four eggs which are greenish white spotted with brown. The White-winged Crossbill (*L. leucoptera*), distinguished at once by its pinkish coloration and two conspicuous white wing-bars, is a native of northern North America and western Europe, but in general habits does not differ essentially from the other species.

American Goldfinches. — Remembering the vast number of forms comprising this family, we must perforce pass with the briefest mention such as the Leucosticte, large, essentially terrestrial Finches of the colder parts of eastern and central Asia and western North America; the Redpolls, or Linnets (*Acanthis*), small, streaked, red-capped, and often rosy-breasted Finches of the northern part of both hemispheres; the Goldfinches (*Carduelis*) of the Palæarctic region; the Siskins (*Spinus*), small, arboreal, mainly black and yellow Finches of the Palæarctic and Nearctic and Neotropical regions, and the American Goldfinches (*Astragalinus*), the best-known of which is the familiar Thistle-bird, Yellow-bird, or Wild Canary (*A. tristis*) of eastern North America. The latter is a permanent resident and abundant throughout practically all of its range, going about in small flocks with a peculiar undulating flight. "Few birds," says Chapman, "seem to enjoy life more than these noisy rovers Every month

brings them a change of fare, and in pursuit of fresh dainties the nesting time is delayed almost until summer begins to wane. Seed-bearing plants, whether in field or garden, form their larder; the old sunflowers rattle before their vigorous attack; the thistles spring into sudden blossoms of black and gold as they swing from the nodding heads." The nest, placed in forking branches often of shade trees about houses, is a dainty structure of fine grasses, strips of bark, and moss, lined with thistle-down. The three to six eggs are plain bluish white. A considerable number of subspecies and closely related species carry the Goldfinches throughout the Western States and southward through Mexico and Yucatan to Patagonia.

Canary. — At this point mention should be made of the Old World genus *Serinus*, which includes among others that most widely known and highly prized of all singing cage birds, the Canary (*S. canarius*). It is a native of the Canaries, Azores, and Madeira, and was introduced as a cage bird into Europe early in the sixteenth century. In its wild state the Canary is olive- or apple-green above with head and rump finely striped with blackish brown, and golden yellow below fading to whitish on the lower abdomen, the flanks being striped with brownish. It associates in flocks and frequents wooded districts, especially pine woods, vineyards, and gardens, and thus moving from tree to tree, which it does at no great altitude, it has the undulating flight of the Linnet. It is a resident species, though changing from higher altitudes, where it passes the summer, to lower points near the coast during winter. Nidification is begun usually in March near the coast, and the three or four successive broods are reared at higher and higher altitudes until the last of July or August finds them in the high mountains. The nest, a neatly constructed affair of dry grasses, plant down, and moss, is placed in careful concealment in a shrub or low tree, often an evergreen, and at a usual height of eight or ten feet from the ground. The four or five eggs are pale green or pale blue spotted and marked with reddish brown. Its food in the wild state consists of seeds of various plants, tender shoots, and fruit, particularly figs. The song is similar to that of its caged descendants, and while sweet and powerful is scarcely so rich.

Apparently from the first the Canary has taken kindly to captivity and has become an ideal cage bird, breeding readily, often to the number of four or five broods in a year, and is thoroughly reconciled to its cage life. By careful selection and breeding both form and color have been much modified and the voice cultivated to a high degree. The rearing and training of Canaries affords occupation to many people, especially in the Tyrol.

Closely related to the Canary is the Serin Finch (*S. hortulanus*) of central and southern Europe, which winters and is to some extent a resident in North Africa, Palestine, and Asia Minor. It is slightly smaller than the wild Canary and much more brightly colored, and like it goes about in flocks, being found particularly at the foot of the mountains skirting the plains, orchards, vineyards, and gardens. Its call note resembles that of the Canary, and the song is clear and pleasing though not of so high an order of merit.

Purple or House Finches. — Related to the last but very different in ap-

pearance are the Purple or House Finches (*Carpodacus*), a considerable group of small or medium-sized, arboreal Finches, which range throughout the temperate portions of Europe, Asia, and North America. They have short, thick, conical bills and deeply emarginated tails, the adult males having the plumage largely red and more or less streaked, while the females and young are conspicuously streaked, especially on the under parts. The common Purple Finch (*C. purpureus*) is a native of eastern North America, nesting from northern Minnesota and Long Island northward, and in winter ranging widely and somewhat erratically as far south as the Gulf States. It is not particular as to its surroundings, sometimes finding a congenial home in wild mountain forests and again becoming a familiar garden bird. It feeds very largely on buds and is often very destructive to the blossom buds of fruit trees. Of its song, Mr. Bicknell says: "Although the Purple Finch often essays to sing in the autumn and earliest spring, its full powers of voice belong alone to the nuptial season. Then it easily takes its place among our noteworthy song birds. Its full song is a sweet-toned, carelessly flowing warble, — not too brief to miss definite character as a song, and positive enough in modulation and delivery to find ready place in the memory. The song bursts forth as if from some uncontrollable stress of gladness, and is repeated uninterruptedly over and over again, while the ecstatic bird rises high into the air, and, still singing, descends into the trees." The nest is a neat structure of twigs, grasses, and rootlets, and lined with hairs, and is usually placed in a coniferous tree. The eggs, from three to six in number, are blue, spotted with fuscous about the larger end. The best-known of the western representatives of the genus is the House Finch (*C. mexicanus frontalis*), which is a familiar bird at lower altitudes throughout much of the country west of the Great Plains and from Oregon and Wyoming to Mexico. As Mr. Nehrling says: "The special favorites of man among the birds are those which take up their abode habitually in the garden and in or near his buildings. Such an one is the House Finch. Wherever they occur, these beautiful birds have won the friendship of man. They are exceedingly tame, building like the European Sparrow in nesting boxes put up for them, in outbuildings, in bushes, and every nook and corner. As soon as the morning begins to dawn, they commence to sing their sweet and melodious strain. Their excellent song, beauty, and familiarity combine to make them great favorites of California rural life." Of the dozen or more Old World species, perhaps the best-known is the Scarlet or Rose Finch (*C. erythrinus*) of eastern and northeastern Europe, which has much of rose-red and carmine-rose in its plumage. Several large species are confined to central Asia.

House Sparrow. — We may not pass by the genus *Passer*, which theoretically stands not only as the most typical member of the family, but is that which furnishes a name for the entire order (*Passeriformes*). It introduces that vast nondescript group of Sparrows, and is characterized by a rather short, stout bill, moderately long, pointed wings, the plumage without red or yellow and without streaks on the under parts. The back, however, is conspicuously streaked with black, on a brownish or rufescent ground, and the adult males

— both sexes in some species — have the throat black; the wings are provided with one or two white bars. This genus is well represented over the greater part of the Old World, the species being mostly well-known birds which frequent the neighborhood of towns and villages, though a few are found in open country away from houses. Of these the best-known is of course the common House Sparrow (*P. domesticus*), which is familiar alike in town and country throughout Europe generally, northern Africa, and most of Asia, extending as far east as Cochin China and Ceylon. It has also been introduced and become thoroughly naturalized in other parts of the world, notably New Zealand and the United States, where it has become an intolerable nuisance. The English Sparrow, as it is more commonly called here, was first introduced at Brooklyn, New York, about 1851 or 1852, and for the first twenty years was practically confined to the cities of the Atlantic States, but since that date it has spread like a pernicious tidal wave over most of the United States and Canada. Active, vociferous, pugnacious, and thoroughly adaptable, it has evidently come to stay, notwithstanding the warfare that is constantly waged against it. It is extremely prolific, rearing three or four broods each season, and Mr. W. B. Barrows has computed that the progeny of a single pair might amount in ten years to 275,716,983,698! It has displaced to a large extent many of the native birds, such as Bluebirds, Wrens, Swallows, etc., and even made it necessary to change the architecture of buildings, at least as regards exterior ornamentations, since when ornate these are made use of as nesting sites by the Sparrows. Its lack of song, destructiveness to grain, fruit, buds and blossoms of fruit trees, grapes, and a dozen other things combine to make it thoroughly detested, and should stand as a warning against the indiscriminate introduction of birds from one country to another.

European Tree Sparrow. — Rather closely related is the European Tree Sparrow (*P. montana*), which differs principally in its smaller size, purplish brown crown, and similar plumaged sexes. It is found throughout Europe generally and eastward through Asia to China and Japan, and south along the Malay Peninsula to Java and the Philippines, and has been introduced into the United States near St. Louis, Missouri. In Europe, according to Dresser, it is not so often found near habitations as it is in the fields and groves, whereas in the east it to some extent takes the place of the House Sparrow and is found chiefly around habitations. It is cheerful and quite as active, though hardly so noisy, its note being similar but softer, and the male has a regular song. In Europe it places its nest usually in trees, but in the east it nests in holes about houses and other buildings.

Snowflakes, or Snow Buntings. — Emblematic of the frozen north and fitting accompaniment of whirling snows are the beautiful Snowflakes, or Snow Buntings (*Plectrophenax*) of the Arctic and sub-Arctic districts of the Northern Hemisphere. They are medium-sized, long-winged, and small-billed terrestrial Finches, in which the plumage is largely and sometimes chiefly snow-white, though there is considerable difference between the summer and winter plumage. Thus in the Common Snowflake (*P. nivalis*) the adult male in summer

is mostly pure white, but with the back, the greater portion of the wings, and four to six of the middle tail-feathers black. The winter dress is similar, but the white parts, except on the under parts of the body, are stained with rusty brown. The female, which is smaller than the male, has the black feathers with white or buffy white edges, these being more or less stained with rusty brown in winter. This species breeds in the Arctic and sub-Arctic districts quite around the globe, except on the islands, in Bering Sea and the Aleutian chain, where it is replaced by the larger, whiter, and longer billed Townsend's Snowflake (*P. n. townsendi*). "It occurs," says Mr. Nelson, "along the more rugged parts of the coast, on rocky and barren islands, and the bare and desolate shores of the Arctic Ocean. . . . When we landed at any of these places we were certain to be greeted by the clear, sharp note of the Snow Bunting, which would be seen running busily about searching for food or wheeling about from place to place, its sharply contrasted black and white plumage quickly attracting the eye, and usually the first sign of life. On the mountain sides at Plover Bay its mellow note was heard on June 26, uttering the long, clear, and rather hard song, full of wild and exhilarating melody, fitted to the surroundings. This song consists of four or five whistling notes, which are uttered from a rocky point or the top of some jutting ledge." The nest is placed on the ground, usually under a boulder, and is neatly made of dried grasses, weed stems, etc., and lined with feathers and occasionally hairs; the four to six or seven eggs are pale greenish spotted and blotched about the larger end. After the nesting season is over, the Snowflakes congregate in flocks often of great size and wander somewhat irregularly to the southward, usually reaching the northern border of the United States and even farther, or in the Old World to Japan, Manchuria, and northern China, and there is perhaps no more beautiful sight than a swirling bevy of these birds as I have often observed them in northern New England, as they go whirling over the snowy fields like a thousand animated snowflakes, or settle upon and around the weed stalks to search busily for their food. The only other species is McKay's Snowflake (*P. hyperborea*) of the north-central islands in Bering Sea and western Alaska, which is pure white throughout except for black tips to the primaries and middle tail-feathers.

Longspurs; Song Sparrows. — Quite similar in habits and to some extent in distribution, but very different in coloration, are the Longspurs (*Calcarius* and *Rhynchophanes*), so named from the extreme elongation of the slender hind claw. But these, together with a vast concourse of Sparrows, we must pass over, merely selecting a small group here and there. Of the latter the Song Sparrows form one of the most interesting aggregations of fringilline birds found in the Nearctic region. They are small, medium-sized, or large Sparrows, grayish, brownish, olive, or rusty above, more or less distinctly streaked, especially on the back, with darker. The lower parts are mainly whitish, with the chest and sides usually streaked with rusty, brown, or dusky. The genus (*Melospiza*) embraces three species, one of which, the real Song Sparrow, has become divided up into twenty or more subspecies, which together cover practically all of North America. Of this bird Mr. Ridgway says: "No other bird of the Nearctic region

has proven so sensitive to influences of physical environment, and as a result of this plasticity of organization it has become divided into a large number of geographical forms, some of extensive, others of very circumscribed, range, the area of distribution in every case coinciding strictly with uniformity or continuity of physical conditions. Thus the form having the widest distribution is that inhabiting the Atlantic watershed, or the entire region from the wooded valleys of the Great Plains eastward, while those of most limited range belong to the Pacific slope, where the topographic and resultant climatic features are so varied and complicated. In California, for example, practically each distinct drainage area has its own peculiar form, one being strictly limited to the salt marshes fringing San Francisco Bay. From the last-mentioned point, inhabited by decidedly the smallest of all the subspecific forms, northward along the coast there is a gradual change, the size steadily increasing, the plumage becoming first more rusty, then more sooty, and finally more grayish, until the extreme limit of variation is reached in the gigantic Aleutian Song Sparrow of the Shumagin and Aleutian islands."

FIG. 231. — Song Sparrow, *Melospiza melodia*.

The Song Sparrow, especially the eastern form (*M. melodia*), is one of the best known and most welcome of our bird visitors, often seeking the proximity of houses, where they build their nests and rear their young within a few feet of constantly passing people. The nest is a neat affair placed in a low bush, hedgerow, or on the ground, and the eggs, usually four or five, are dull white much spotted with darker. The song is delightfully sweet and may be heard from earliest spring to latest fall.

Swamp Sparrow. — The other species are the Swamp Sparrow (*M. georgiana*) of the eastern United States and Lincoln's Sparrow (*M. lincolni*) of the western United States.

The **Juncos** (*Junco*) form another typically American group of some twenty forms. They are small birds, about six inches in length, the adults plain gray above, often darker on the head, and plain grayish or whitish below. The lateral tail-feathers are largely white and form a conspicuous feature when the bird is in flight. They are strictly granivorous, frequenting hedgerows, weedy fields, and gardens. The best-known and most widely distributed form is the Snow-bird, or Slate-colored Junco (*J. hyemalis*), which is found over entire North America, though rarer in the western portions, breeding from the mountains of Pennsylvania, New England, and Michigan northward to Labrador,

FIG. 232. — American Sparrows.

1. Junco, or Snow-bird (*Junco hyemalis*).
2. White-throated Sparrow (*Zonotrichia albicollis*).
3. Fox Sparrow (*Passerella iliaca*).
4. Tree Sparrow (*Spizella monticola*).

Hudson Bay, and the Yukon Valley; in winter it is found from Virginia southward. The nest is placed in a slight depression in the ground and is lined with grasses and rootlets. The eggs, usually four, are grayish or pinkish white thickly spotted at the larger end. It has, especially in its summer home, a very clear, sweet trill. The other forms are mainly found in the more western portions of the country, their habits being similar to those of the common Snow-bird. A curious, aberrant form (*J. vulcani*) is found only among the scrubby growth on the ash-cones of the volcanoes of Irazú, Costa Rica, and Chiriqui, Panama. It is the only species having a streaked back and plain tail-feathers.

Other North American Sparrows. — Closely related to the Juncos is the genus *Spizella*, with seven species and five subspecies. They are small arboreal or semi-arboreal Sparrows with a small bill, long emarginate or doubly rounded tail, and a brownish, conspicuously streaked back, the lower parts being plain whitish, grayish, or brownish, and the abdomen always white. The best-known is the common Chipping Sparrow (*S. passerina*), found abundantly throughout the eastern United States and the British provinces west to the Great Plains. It breeds from the Gulf coast northward, being partial to the vicinity of human habitations. The nest is usually placed in bushes, hedges, and low trees, and is a rather slight affair of weeds and grasses and lined with horse-hair. The eggs, usually four, are greenish blue sparsely spotted with brown or black at the larger end. Several races are found in Mexico, Guatemala, and the west. Other species are the Tree Sparrow (*S. monticola*), which nests in Newfoundland, Labrador, and the Hudson Bay region, coming south in winter; the Field Sparrow (*S. pusilla*) of the Eastern States; the allied Mexican Field Sparrow (*S. wortheni*) and the Clay-colored Sparrow (*S. pallida*) of the Great Plains.

White-throated and White-crowned Sparrows. — Near relatives of the last are the Zonotrichias, a genus of large, semi-arboreal Sparrows with grayish or brownish streaked back, two white wing-bars, and two broad stripes of black on each side of the crown which enclose one of white or yellow. Of these the White-throated Sparrow (*Z. albicollis*) is a well-known bird of the eastern United States, though breeding mostly beyond our northern borders. It may be known by the white throat and the bright yellow supra-loral spot. The White-crowned Sparrow (*Z. leucophrys*) has much the same range and may be recognized by the white crown and white superciliary band. Sometimes separated as subspecies of the last is Gambel's Sparrow (*Z. gambeli*), which is found throughout western North America, while the Golden-crowned Sparrow (*Z. coronata*) is confined to the Pacific coast. The last has the crown yellow and the superciliary band olive-yellow.

Galapagos or Ground Finches. — The Galapagos Archipelago is the home of a group of some thirty-five species of so-called Ground Finches. They are stoutly built, short-tailed, semi-terrestrial birds with a peculiar, strong, but very variable bill. There is some difference of opinion as to the generic limits, but according to Ridgway three genera may be readily recognized. These are the monotypic *Platyspiza*, *Camarhynchus* with nine, and *Geospiza* with twenty-five species. These birds have been isolated for so long a time that

almost every island has its peculiar form or set of forms. In the first genus (*Platyspiza*) the color is dull olivaceous above and whitish streaked with dusky below, the adult males with head, neck, and chest black. In *Camarhynchus* the species are similar in coloration to the last, though in some the males are without any black; but the bill is very different, being much more compressed. *Geospiza* is also similar to the first, but the adult males are almost entirely black, and the bill is extremely variable in relative length, depth, and width. Snodgrass has recently investigated their food to ascertain if there is any relation between it and the size and shape of the bill, but the results are entirely negative, and we must apparently look elsewhere for the explanation of the variation. The species of this genus are very close together.

Buntings. — The last of the three groups or subfamilies into which Dr. Sharpe and others have divided the *Fringillidæ* embraces a very large number of birds known collectively as Buntings, which are distinguished principally by the fact that the conical and sharply pointed bill does not have the edges of the two mandibles in contact throughout their length, but forming an angle about midway. There is also a more or less pronounced hard, horny process or knob on the palate. But there are grave differences among ornithologists as to the validity of this group, Dr. Sharpe himself acknowledging that it is more or less artificial; while Mr. Ridgway was not able to recognize it at all, and has dispersed the American forms included in it among the typical Finches. It follows from this that no apparently thoroughly satisfactory arrangement of the *Fringillidæ* has been thus far proposed, nor can there be until the anatomy of the many forms is better known. Without attempting to sift the subject as it perhaps deserves, we will simply consider a few of the true Buntings (*Emberiza*), of which there are upward of forty species, all natives of the Old World. They agree essentially in habits and appearance with the ordinary conception of a Sparrow, being small, rather brightly colored birds of more or less gregarious nature, frequenting grain-fields, waste lands, and grassy tracts of country, and feeding largely on grain and seeds of all kinds.

Corn Bunting. — One of the largest species is the Corn Bunting (*E. miliaria*), which attains a length of seven and a half inches, and occurs throughout Europe generally, from southern Scandinavia to the Mediterranean and east to the Urals, retiring in part to northern Africa in winter. In addition to its large size, it has the upper parts grayish brown striped with blackish brown, and the lower parts white spotted and streaked with blackish. It is a quiet, not to say dull, clumsy bird of very sedentary habits, frequenting grain-fields, meadows, commons, and other open places, and loves to perch on some weed stalk, bush, or telegraph wire, where it will remain motionless for an hour at a time, giving voice to its monotonous and rather uninteresting song. During the breeding season it is scattered about in pairs, but in the autumn it congregates in small flocks, and in company with other species finds a livelihood in stubble fields, stockyards, and about farm buildings. In the more northern portions of its habitat it is partially migratory, but in England, for instance, it is considered a resident species, and is one of the latest to set about household cares, usually

deferring this duty until May. The nest, a rather slight structure of grasses, fibrous roots, and a few twigs, and lined with horse-hair, is placed on or near the ground among grass or herbage and the complement of eggs numbers from four to six, these in color being dull white or pale yellowish, with blotches and streaks of purplish brown. In summer the Corn Bunting feeds largely upon insects, but in autumn and winter on grain and various seeds.

The **House Bunting** (*E. saharæ*) of Morocco, Algeria, and Tunis has the upper parts rufous indistinctly striped with brown, and the under parts unstriped rufous. It is a very tame and confiding species, frequenting the native houses, often, according to Mr. Dresser, entering the rooms in search of food, and picking up crumbs from the table. It feeds on insects, seeds, and any scraps it can find about the native huts, and being protected by the Arabs, is said to be even tamer than the English Robin. "It breeds in March and April, and the nest, which is usually placed in a hole in a wall or on a rafter, is constructed of fine twigs or sticks and grass bents lined with hair, cotton, or wool." The eggs, usually three in number, are white finely spotted with brownish.

Black-headed Bunting. — Quite closely resembling the Corn Bunting in habits and general appearance is the handsome Black-headed Bunting (*E. melanocephala*) of southeastern Europe, coming as far east as Italy, whence it ranges eastward through Asia Minor and Palestine to Persia, sometimes straggling to France and Great Britain. It has the forehead, crown, and nape deep black, the back, rump, and scapulars orange-chestnut, and the whole lower surface deep yellow with pale lilac margins to the feathers. It is found in cultivated grounds and fields, feeding on insects and seeds during the summer and on seeds and grain during the winter. Usually tame and approachable, the male is often seen perched on a low bush or tree near the nest and uttering at frequent intervals his low, simple, but quite sweet song. Lindmayer states that it is "peculiarly partial to vineyards, where it builds on vines, pomegranates, thorns, or almond trees," constructing a carefully made nest of straws lined with horse-hair. The five eggs, the usual complement, are pale sea-green, scatteringly spotted with dark brown, or sometimes entirely unspotted.

Yellow Bunting; Yellowhammer. — Another common and well-known species is the Yellow Bunting (*E. citrinella*), or Yellowhammer, as it is perhaps more frequently called. It is a handsome little bird, a trifle over six inches in length, with the head, neck, breast, and lower parts bright yellow, more or less streaked with dusky, while the mantle is brown striped with darker brown; the female has the yellow portions less bright and the lower parts darker streaked. Its home is in central and northern Europe, extending eastward into Asia as far as Turkestan. It is slimmer, more graceful, and of course more brightly colored than the Corn Bunting, but it frequents much the same situations, including also rough commons and waste lands. Here, says Mr. Hudson, "you may hear his song at all times of the day, even during the sultriest hours; for although the Yellowhammer remains with us (in England) throughout the year, and is able to resist the colds of winter, he is a great lover of heat. The song is very different from that of the Corn Bunting; it is composed of half a dozen

or more short, reedy notes, all exactly alike, and shaken out, as it were, in a hurry, followed by a long, thin note, or by two notes, slightly melodious in character. It may be described as a trivial and monotonous song, but it is a summer sound which most people hear with pleasure, and the Yellowhammer, 'little-bit of-bread-and-no-cheese,' as it is called in imitation of its note, is something of a favorite with country people." The nesting habits are similar to those of the common species.

Cirl Bunting. — Perhaps most closely related to the last, but more beautiful in coloration and in many ways more pleasing, is the Cirl Bunting (*E. cirlus*), which is rather locally distributed throughout central and southern Europe, being, for example, an uncommon and thinly distributed species in England, where it is restricted to the southern and western counties. About six and a half inches long, it exhibits quite a variety of colors, the upper parts being reddish brown with dusky spots, and the abdomen dull yellow, while the crown is olive streaked with black, the gorget and a line both above and below the eye bright yellow, and the breast olive-gray, with the sides chestnut. The Cirl Bunting is a resident species except in the more northern portions of its range, though it occurs in winter in the south of England; but whether these are the same individuals that spend the summer there or have come down from farther north, is not known. It frequents much the same situations as the Yellowhammer, that is, meadows, cultivated ground, hedgerows, etc., though the male when he takes his stand to sing prefers to perch rather higher, as on hedgerow elms and other large trees. The song is very like that of his relative, though lacking the long, thin note at the end, and the nests and eggs are not to be easily distinguished. It breeds rather earlier, however, rearing two broods, the first in May and the second in July. During the summer it feeds almost entirely upon insects, the young being fed largely on grasshoppers, but at other times it feeds in company with other Finches upon seeds and grain.

Yellow-throated Bunting. — In eastern Siberia, Manchuria, and Japan the above is replaced by the Yellow-throated Bunting (*E. elegans*), which is known by the more chestnut-brown upper parts, a larger patch of black on the breast, and a yellow throat. It is found on the borders of forests and is said to be the best songster among Buntings, Mr. Dresser speaking of its song as being particularly rich and melodious. It places its nest on the ground among bushes and lays usually five eggs, these being white, variously marked with white and brownish black.

Ortolan Bunting. — The name "Ortolan" has been so long familiar in many parts of the world, especially among epicures, that it has almost passed out of memory that it is, by right of ancient and original usage, the property of a Bunting (*E. hortulana*). The application of the word, which is traced back through modern and archaic French to the Latin signifying "a gardener," is difficult of explanation; but the fact remains that it has been for centuries applied to this little Bunting, and further the practice of artificially fattening them appears to be very ancient. The Ortolan, or Ortolan Bunting, then, is a rather plain-plumaged little Bunting, occurring throughout Europe generally, as well as western

Asia as far east as Turkestan, though it is only a rare straggler to England. With the upper parts brown streaked with darker, it has the lores, throat, and a ring around the eye lemon-yellow, the fore breast greenish yellow, and the remainder of the lower parts tawny chestnut. It is a rather tame, approachable bird, frequenting, according to Mr. Dresser, "the outskirts of woods, bush-covered meadows and fields, gardens when they are near woods, fences, and bushes on the roadsides, and I often saw it sitting on barns and outbuildings, and in its general habits reminding me much of the Yellowhammer." It is a migratory species in Europe, arriving in March and April and returning in large flocks in September to spend the winter in northern Africa. It is on their southern migration that they are netted alive in large numbers, and being kept away from the light of day and fed on millet, oats, and other seeds, soon become excessively fat, and are then highly prized for the table. Its song and nesting habits are similar to those of the Yellowhammer.

Fig. 233. — Ortolan Bunting. *Emberiza hortulana.*

Reed Bunting. — The last species that space will permit of mentioning is the Reed Bunting (*E. schæniclus*), which is widely spread throughout Europe generally as far north as Lapland, and in Asia to Kamchatka and Japan on the west and to Turkestan on the south, wintering in northern Africa and northwestern India. As suggested by its name, it is a frequenter of damp situations such as reeds and willow and alder thickets along streams and marshes, and it is a rather more graceful bird than many of its relatives. It has a loud, clear call note, and a rather loud, persistent song which is rehearsed from the top of a tall reed or the topmost branch of an alder tree. It nests in March or April, placing the structure on or near the ground in damp places, and laying from four to six or sometimes seven eggs, which are purplish clay-colored with purplish brown spots and streaks. In coloration the upper parts are black, the feathers being margined with ochraceous, the head, nape, and throat deep black, while there is a white collar around the hind neck with a white throat stripe on each side; the lower parts are white, striped on the flanks with dark brown.

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